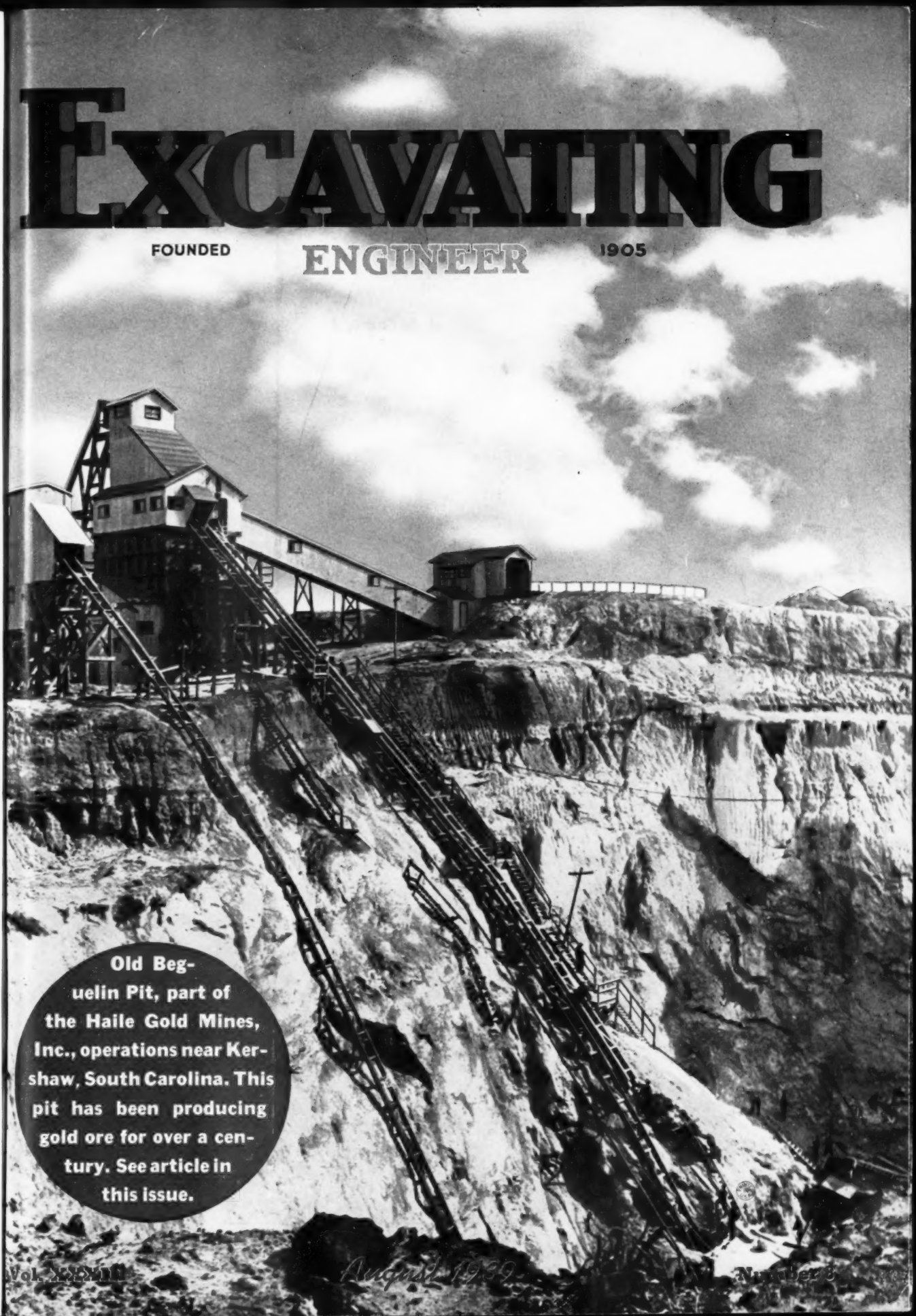
EXCAVATING

FOUNDED ENGINEER 1905



Old Beguelin Pit, part of the Haile Gold Mines, Inc., operations near Kershaw, South Carolina. This pit has been producing gold ore for over a century. See article in this issue.

Vol. XXXIII August 1959 Number 8

Weighs 8½ to 9 tons; Travels 4¼ miles per hour; Steers like a tractor; Power 38 to 56 H.P.; Swings 5 r.p.m.; Hooked Conical Rollers (no center pintle); Twin, positive rope crowd; 28 Ball and Roller Bearings; Automatic Lubrication.

"Have watched other shovels and still think I made a very good investment in my 10-B," says Roy Crandall.

"Very quick at its work" says Mr. Crandall and backs that up by telling us how he has loaded 700 yards of top soil to trucks in 9 hours. You'll have a hard time matching that with any ordinary ⅜-yard shovel, according to Roy. He likes the ease of operation and the quick, handy way the 10-B can be moved from job to job. Ask us to show you the kind of output other owners are getting with this world's fastest selling shovel.

AT-59

Bucyrus-Erie

BUCYRUS ERIE

SOUTH MILWAUKEE WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

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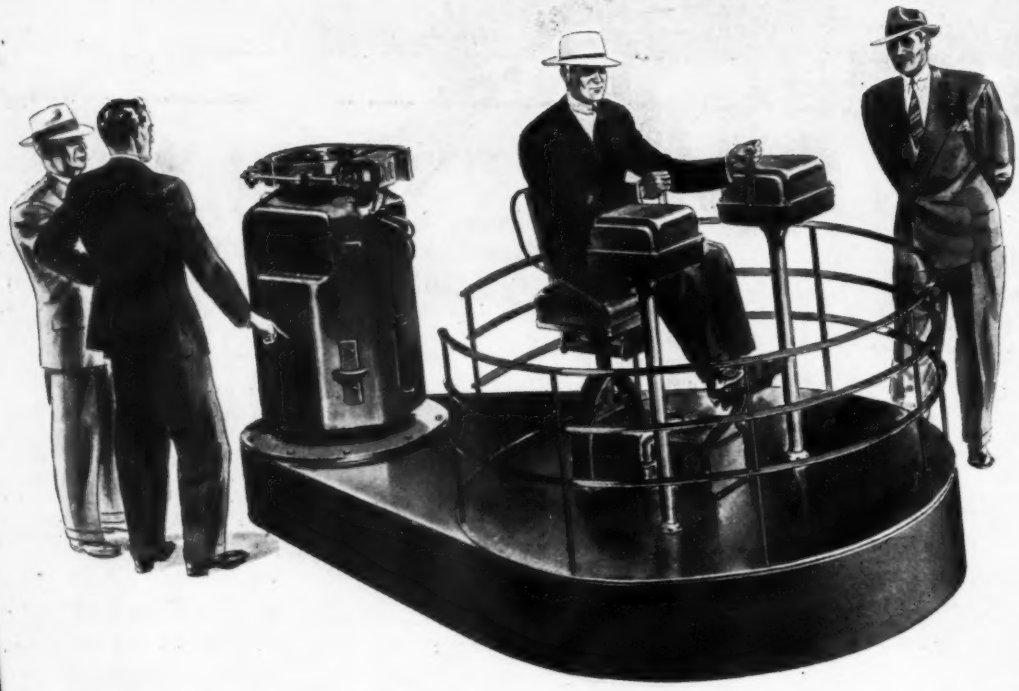
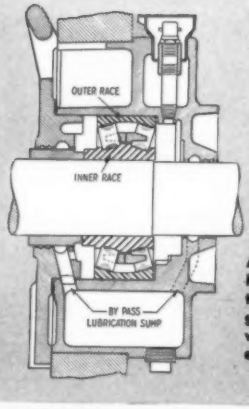
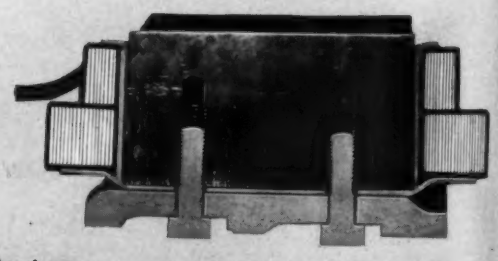


Ride the cab with Westinghouse—get the feel of Westinghouse controls—the ease and dependability of operation. At the Mining Congress—August 28 to 31. Exhibit space 308, 309, 316 and 317.

At left — Vertical type shovel motor, pioneered by Westinghouse, saves space, provides long-life durability of totally enclosed gearing.



At left—Shovel motor housings are dust-tight and arranged for grease lubrication, with by-passes to an excess lubricant sump.



Above — Cross section of motor field coil. Patented construction holds these coils tightly in place and eliminates spring washers and other loose parts. Coils impregnated with high grade insulating varnish, resistant to dust, moisture and oil.

Westinghouse

New World's Record...
...Set at Coulee Dam

A WORLD'S RECORD which many construction men believe will stand unchallenged for a century, if not for all time, was set May 25 when crews of Consolidated Builders Inc. placed 20,684 c. y. of concrete in Coulee Dam. Average production was one yard of concrete every 4.18 seconds, or 861 c. y. every hour . . . . . .

Theoretical capacity of the mixing plant (operating on a 2-minute mix) had been placed at 18,432 c. y. By clipping seconds, and half-seconds, at every corner. this theoretical capacity actually was exceeded by 2,252 c. y.—or about one-ninth!

NO DELAYS—The story of the record pour is a story of superb engineering management, splendid esprit de corps and mechanical perfection, in which every man and every machine performed his or its allotted task perfectly. There were no mistakes, no mechanical failures and no delays. . . . . .

SYNCHRONIZATION—Involved in the operation are the world's largest cement-handling plant, aggregate plant, belt conveyors, concrete mixing plant and concrete placing equipment. Exactly synchronized and geared to maximum capacity, all of these gigantic units functioned flawlessly throughout the record-breaking day. ***From one mid-night to the next, the mixing plant never stopped a second, the eight 4-yd. mixers revolving and tilting continuously.*** . . . . . .

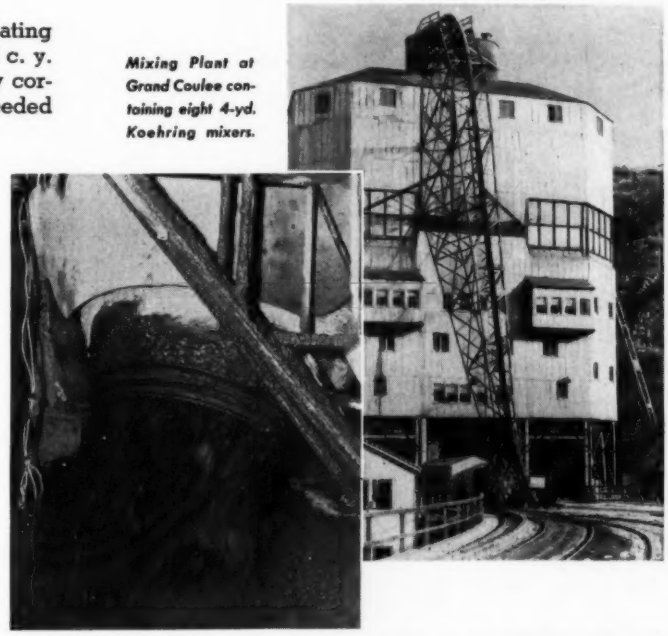
MIXING TIME REDUCED — Higher production of the day and swing shifts was aided by the fact that the Bureau of Reclamation allowed CBI to cut the mixing time five seconds in the morning and five more seconds in the afternoon and evening. Thus the graveyard shift used the normal two-minute mixing time, the day shift used 1 minute and 55 seconds; and the swing shift, 1 minute 50 seconds.

These successive reductions in mixing time were permitted because efficiency tests conducted by the Bureau's laboratories disclose that the resultant mix was in no way inferior to the regular 2-minute mix.

Efficiency tests are conducted periodically every day by Bureau engineers to determine if the cement is properly dispersed through the mix. If the mix is not within 10% uniform, the mixing time is increased. The 1 minute, 50 second mix ran well within the requirements of uniformity . . .

Excerpts from Pacific Builder and Engineer Issue of June 3, 1939.

CONGRATULATIONS to Consolidated Builders, Inc. for their Remarkable Achievement



Mixing Plant at Grand Coulee containing eight 4-yd. Koehring mixers.

Here's the sight that makes CBI officials smile. A 4-yd. Koehring mixer, such as this, dumps 24 batches an hour, sometimes 26 or 27. Theoretical capacity of the 8 4-yd. mixers, operating on a two-minute cycle, is 18,432 c.y. per day. They produced 20,684 c. y. on May 25 when mixing time was reduced. They operated for 24 consecutive hours without stopping once.

Koehring is indeed proud to have the privilege of being a part of the highly efficient organization for mixing and pouring concrete at this record breaking pace. We are proud Koehring mixers *did not fail* when called upon to do their share in establishing this record run. These mixers had poured more than 5,000,000 yards prior to this record run. Continuous service from Koehring equipment is that extra value you buy in all Koehring products.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

Mining Gold in

South Carolina

Employing modern equipment and methods, the Haile gold mine in South Carolina is the leading gold producer of the Appalachian region.

By

EDMUND NEWTON
Mine Manager, Haile Gold Mines, Inc.

HARLAN H. BRADT
Managing Engr. Haile Gold Mines, Inc.

RICHARD S. MERRITT
Lawrence Contracting Company

THE MINING of gold in South Carolina is not as mythical as many people think. Since early in the 1800's, the yellow metal has been found over a wide belt extending from near Washington, D.C. southwestward to central Alabama. Probably more than 1500 individual properties in this area have produced gold.

Although this region, known as the Appalachian Belt, has never caught the public's fancy like the California and Alaskan gold fields, it has had a romantic history, and like the other gold fields, it has not been spared by the stock-selling promoters. More than one failing farm with a few quartz veins showing "colors" has paid handsomely to its owners who have leased or sold the property with a substantial down payment and later repossessed the property and repeated the operation.

Increase in Price of Gold

This practice has discouraged reputable mining concerns from developing the Appalachain Belt, but in the past few years interest has been revived, partly as a result of the increase in the price of gold to $35.00 an ounce, and also because the advancement in mining and milling technique, over a period of years has made it possible to mine at a profit many of the low-grade deposits, from which the high grade ore was removed years ago.

Such is the case at the Haile Gold Mine, near Kershaw, S. C. Gold was discovered on this property in 1827, and since then it has produced approximately $4,500,000.00 in gold at the old price of $20.67 per ounce. It has always been the most successful and largest single producer in the Appalachian Belt. During its history the mine has changed hands several times, and in 1934, the present organization, Haile Gold Mines, Inc., took over the property. The first two years were devoted to exploration and metallurgical testing of the ore. Construction of the first unit of the cyanide plant was begun in January 1937, and in July of that year the first gold was precipitated.

Ore for the 400-ton mill is mined in the old Beguelin Pit and in the new Red Hill Pit, which was opened late in 1938. The Red Hill ore body was discovered with the aid of the latest type geophysical instruments, during the

● Presenting some of the men behind the operations. Left to right: Edmund Newton, M. C. Sherrill, D. B. Gregg, H. S. West and Harlan H. Bradt. (Messrs. Newton and Bradt are two of the co-authors of this article).

● Left: A jackhammer crew preparing for a blast on the wall of the old Beguelin pit.

● Air view of the Haile operations. Old Haile and Bumelo pits lower left; Red Hill and water reservoir lower right; Chase Hill pit right center; cyanide plant, Blue Pool, Blauvelt and Beguelin pits upper center.

comprehensive exploratory surveys covering more than 3,500 acres. Subsequently, diamond core drilling and churn drilling have shown that the Red Hill deposit contains a large tonnage of ore averaging about $5.00 per ton. In addition, the geophysical work has indicated 19 other "anomalies" on the property, several of which are being drilled to determine their value.

120,000 Yards will be Stripped at Red Hill Pit

To open the Red Hill Pit for mining, an estimated 120,000 cubic yards of overburden are being stripped. This work is being done under contract by the Lawrence Contracting Company of Charleston, S. C., and to date, some 65,000 cubic yards have been excavated. The ore occurs in a lense-shaped body dipping downward at an angle of about 45 degrees. The top of the lense is only a few feet from the surface, but to uncover the upper side of the lense, so that a shovel can load the ore into trucks, it is necessary to remove a wedge of overburden approximately 250 feet wide and 600 feet long at the surface and 60 feet deep.

Stripping, under contract, was begun on December 19, 1938, with a ⅝ yard heavy-duty General gas shovel. However, after two weeks, it was found that a larger output was necessary, and a ¾-yard Bucyrus-Erie 22-B gas shovel was ordered. Until it arrived, a ⅜-yard Bucyrus-Erie 10-B shovel belonging to the hauling contractor, was pressed into service, but since January 19th, the 22-B has handled the stripping.

With the exception of 5 or 6 feet of sandy material at the surface, the stripping consists of a decomposed schistose rock, locally known as saprolite, with occasional large quartz boulders and veins. The saprolite requires blasting before it can be dug and considerable difficulty is encountered in some areas in breaking the rock into pieces small enough for the ¾-yard shovel to handle conveniently. The saprolite occurs in layers and tends to split into large slabs, particularly where the formation is hard and the layers well defined. Fortunately, a large part of the formation is sufficiently soft, so that a moderate amount of shooting crumbles the layers. Where the blast holes are dry, DuPont's Free Running No. 4 powder is used, but at present depth of stripping, some water is being encountered and 20% or 40% dynamite, with an extra paraffin dip, is used.

The 22-B loads into 2-yard Fords and Chevrolets and 2¼-yard Internationals, which haul the stripping to a dump, an av-

erage distance of 600 feet. Five trucks are sufficient for a haul of this distance. W. M. Reagan & Sons, Inc. of Weaverville, N. C., have sub-contracted the hauling, and it was one of their 10-B shovels which filled-in during delivery of the 22-B.

Wet Weather "Bug-a-boo"

Wet weather is the "bug-a-boo" of the Red Hill work. After a little rain, the saprolite becomes exceedingly slick, making the pull out of the pit impossible. An RD6 Caterpillar tractor and road machine are kept on the job, by the hauling contractor, to blade mud off the haul road after rains, and also to maintain the road during fair weather. The dump is kept in shape with an Allis-Chalmers No. 30 Tractor with a Baker bulldozer. It also handles rock too large for the shovel and levels off the floor of the pit for drilling.

For several months, drilling was quite a problem. The saprolite is too soft for efficient jackhammer drilling, because it tends to plug the steels. A Keystone churn drill was tried but was too slow, and in order to keep ahead of the shovel, the blast holes had to be spaced too far apart, resulting in coarse breakage and a very uneven floor. Finally an Ingersoll-Rand wagon drill was purchased, and it has proved entirely satisfactory for our pit operations. In 3 minutes it can put down a 12-foot hole, that would require 30 minutes for a man with a jackhammer, and even though it takes longer to move the wagon drill to the next hole, it does the work of 4 or 5 jackhammers. From 800 to 900 feet of 12-foot holes are drilled per day, which is more than enough to keep ahead of the shovel. In its spare time, the drill is used in the mining operations, and in the future, it is planned to test it out for exploratory drilling with holes up to 24 feet deep. Compressed air is supplied by an Ingersoll-Rand two-stage, oil-burning compressor of 315 cubic feet capacity.

● General view of Red Hill stripping and mining operation showing 22-B loading overburden and General loading ore. Stripping dump is in the background at left and ore deposit extends along right hand side of pit.

● Old (left) and new hoisting, storage, and crushing plants at the Beguelin pit. Note the diamond drill outfit in right foreground.

Stripping Output

The output of the 22-B varies considerably from day to day, depending upon the digging. It often reaches 100-yards per hour, and averages 75-yards. In order to dig the saprolite satisfactorily, sharp dipper teeth are necessary, consequently, a repointed set is put on every eight or ten days. Crowd cable life has been surprisingly long, in fact, the original cable is still in use, with 55,000 yards and 700 hours to its credit.

Contrary to expectation, the long "cats" on the 22-B do not

(Continued on page 478)

CHUQUICAMATA COPPER

At Chuquicamata, Chile, the Chile Exploration Company is conducting extensive open pit operations in working the world's largest copper producing mine.

ONE OF THE many valuables in South America's treasure chest of natural resources is copper ore. The Chile Exploration Company is actively engaged in wresting this useful metal from the earth in large scale open pit mining operations at Chuquicamata, Chile near the western coast of South America.

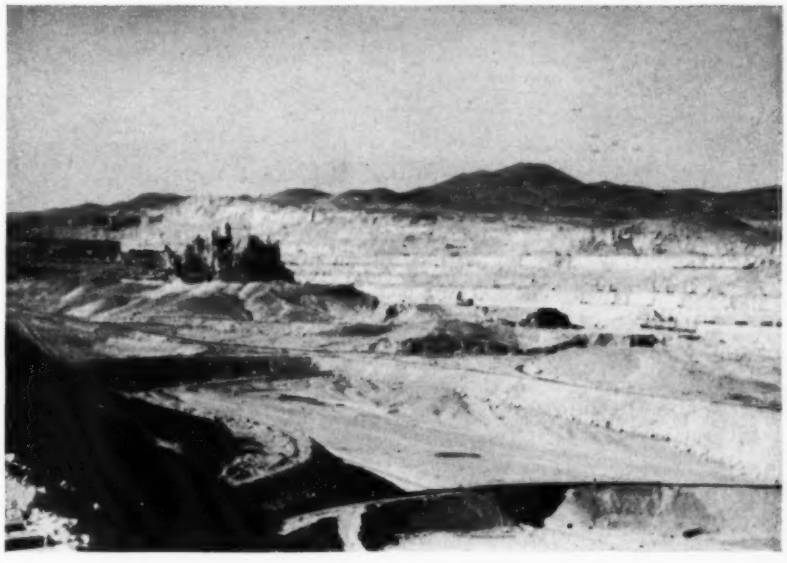
"Chile Ex's" open-pit mine is the largest copper mine in the world in terms of copper productive capacity as well as amount of ore reserves. The mine covers an area of about 8,400 feet long and is opened to a maximum width of 3,000 feet. The copper ore deposit has been drilled to a depth of 1,900 feet, and the holes along the western side were still in ore when stopped. Because of the great size of the mine it has been possible to open the benches in long, level stretches free from grade.

Extensive Use of Modern Equipment

An imposing line-up of modern equipment handles the copper ore output of the Chile Exploration Company's mine. Heading the line-up is a group of 21 electric shovels consisting of two 8-yard shovels and nineteen 4-yard shovels, 13 of which are railroad models. Five of the revolving shovels are equipped with electric car pullers and the remainder of the 4-yard shovels with mechanically actuated car pullers. Three ¾-yard diesels complete the shovel list which are all Bucyrus-Eries with the exception of six Marion RR type shovels and one P & H 4-yard revolving model.

Ninety-three Cyclone electric churn drills and one 29-T Bucyrus-Erie handle the drilling tasks. Two bulldozers, three track shifters, nineteen 75 to 87 ton electric locomotives, fifteen 85 to 91 ton steam locomotives, 460 seventy ton ore cars, 32 thirty yard and 80 twenty yard air dump waste cars, five 15 to 120 ton steam cranes, one 45 ton all electric crane, one steam spreader plow, 20 flat cars, one special car with a drop center for transporting ¾-yard shovels and bulldozers, and box cars for explosives complete the transportation equipment. The mine has 59 miles

● A blast is set off in the northeast section of the mine. Blast holes are charged with 60% strength dynamite.



● Left: A vast panorama of open pit mining operations is this view of the copper mine at Chuquicamata, Chile.

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● Left, top: Large scale blasts of this type move 70,000 to 150,000 tons of ore. Benches are opened up at 40 foot vertical intervals. Bottom: A 4-yard electric shovel loads ore to a car puller spotted train.

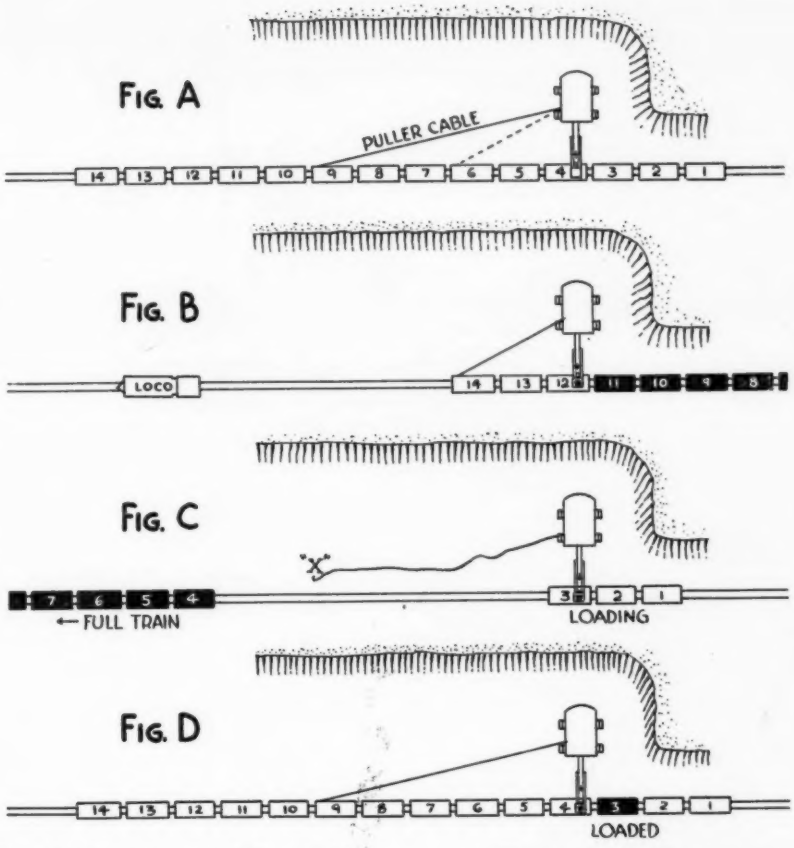
of standard gauge track of which 39 miles are electrified.

The ore body at Chuquicamata lies in three zones namely; oxidized, mixed oxide and sulphide. At present the oxidized ores are being mined along with a small amount of mixed ores. The oxidized ore minerals, Antlerite, Chalchantite, and Krohnkite are principally sub-sulphate of coppers.

Overburden on the deposit was light as the ore body out-cropped at the surface quite extensively. However a certain amount of over-lying waste was removed. Waste is also currently being removed from the pit slopes.

Large Scale Blasting Operations

Production schedules at the Chile Exploration Company's mine call for large scale blasting operations. There are 94 churn drills available to drill the 8 to 10½ inch holes to a depth of 1 foot below grade. The holes are charged with 60% strength dynamite and are detonated with Primacord fuses. Liquid oxygen has also been successfully used as an explosive. The benches are opened up at 40 foot vertical intervals and about 70,000 to 150,000 tons of ore are broken per blast.



● Diagram showing the sequence of operations of the car puller-shovel combination.

An important feature of the mine operation is the unique car puller units used on the 120-B's in order to free the pit locomotives for other duties and to avoid expensive waiting time caused by car-spotting operations. Satisfactory car pullers, geared to the propelling machinery, were designed by the local mine staff and first installed on the railroad type shovels in 1927. In 1935 when contemplating additions to existing shovel equipment, the problem of designing a more efficient rig and one suitable for a 4-yard full-revolving shovel was referred to the Bucyrus-Erie Company and at present five of the full revolving shovels are equipped with the improved car puller.

● Close-up of the car puller. Powered by a 25 horsepower motor it is an independent unit installed on the driving end of the shovel mounting.

Car Puller Mechanism

The mechanism of the car puller is composed of a single drum, independently driven by a 25 horsepower electric motor through a geared speed reducer. The drum, motor and drive are mounted on a welded structural steel frame, bolted to structural

(Continued on page 481)

"DRAGSHOVEL SPECIALISTS"

Digging for buried treasure, constructing golf course bunkers, excavating basements and sewer trenches, are all in the day's work for Morris G. Laramie and Son, Inc.

ONE OF THE busiest excavating contractors in Detroit, Michigan, Morris G. Laramie and Son, Inc., are "specialists" in dragshovel work. At present their outfit is working two Lorains, three Bucyrus-Eries, three Northwests, with several Bucyrus-Erie crane and shovel steamers in reserve for use when the more modern rigs are working to capacity.

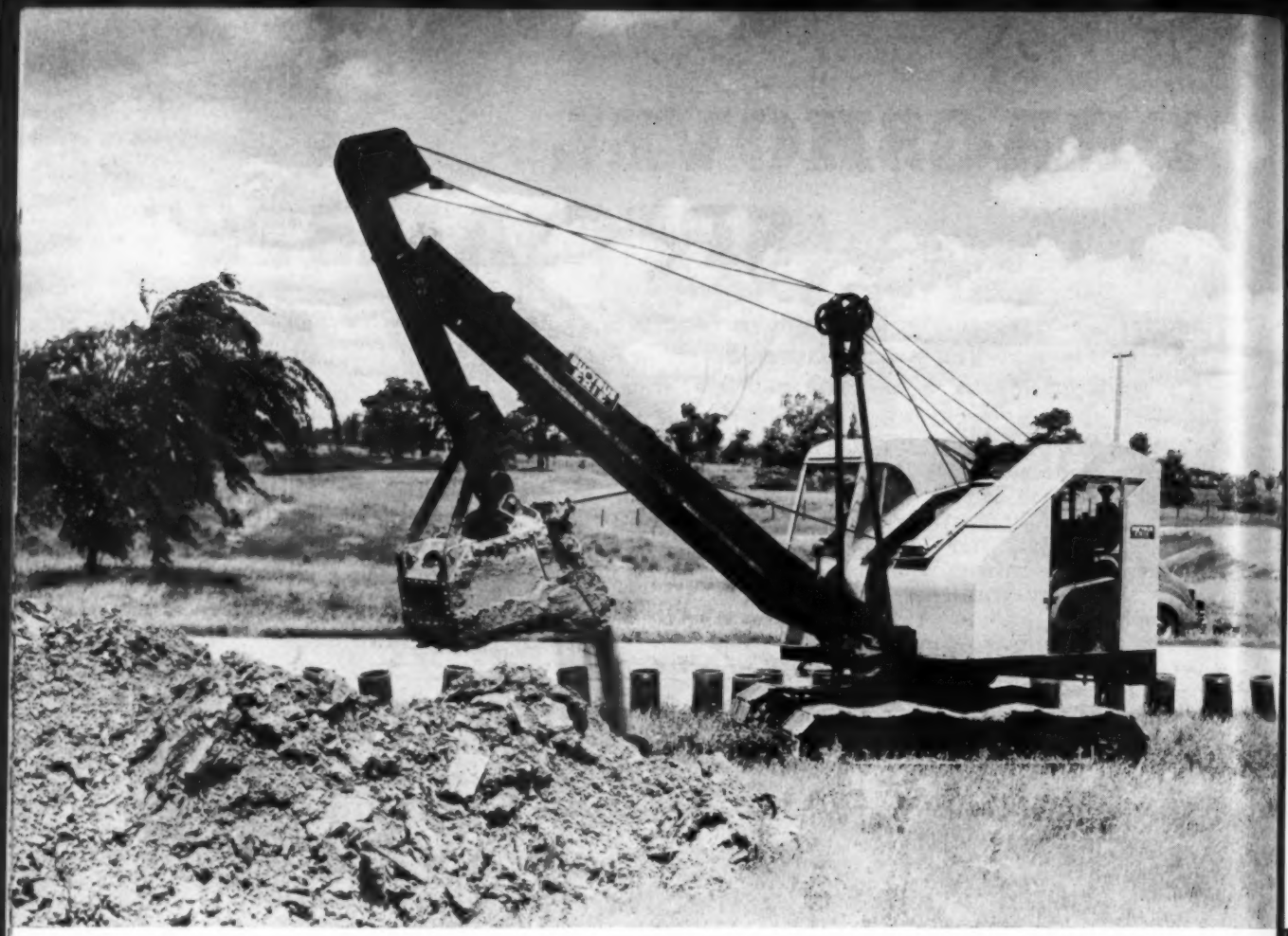
In keeping their fleet of excavators busy, the Laramies find all kinds of work for them. One recent job serves to illustrate the unusual opportunities that may be found by enterprising contractors. Mrs. Thomas J. Middleton hired the Laramie's Bucyrus-Erie 19-B to dig in her back yard—"After a male spirit revealed to me there are two treasures buried there." The Associated Press notice, published in a number of newspapers, goes on to say, "Two broken bottles and a rusty pail were dug up the first day of the hunt, but Mrs. Middleton insists the treasures are 'gold and buried 24 feet down.'"

Unfortunately for Mrs. Middleton, who claimed that the spirits moved the treasure when they saw the shovel coming up the alley, the only "gold" found was the $50 a day rental received for the use of the 19-B.

Keeping the 20-B Busy

When the writer was in Detroit recently, he found another of the

● Mrs. Thomas J. Middleton supervises the Laramie 19-B she has hired to hunt for treasure that was revealed to her by a spirit. (Photo from Pictures, Inc.)



● The Laramie 20-B digs a thousand feet of sewer trench in Detroit. Varying from 6 to 10½ feet in depth, the trench was 34 inches wide. Because of the wet trench sides excavation was carried on only as fast as the pipe could be laid and cemented.

Laramie machines, a ¾-yard Bucyrus-Erie 20-B, doing a more usual type of job. The previous day, the machine had spent seven hours digging tees and bunkers for a golf course. On completion of this work, it was loaded on a trailer and moved across Detroit to a new subdivision about 15 miles out of the city. The trailer used was an 8-foot-wide Rogers. Loading, with one man, took 15 minutes, and the loaded unit traveled 20 to 25 miles an hour.

The job here was to dig 1,000 feet of trench for 12" sewer pipe. The work was done for the subdivision, the 20-B being the only equipment the Laramies had on it. The trench was dug with a bottom width of 34 inches, and ranged in depth from 6 to 10½ feet. Material handled was top soil, dirt and clay, which was so wet the sides of the trench would not stand long. Consequently, excavation was carried on only as fast as the pipe could be laid and cemented.

Two of the firm's Lorain 40's dug sand for the fill on the site of the new plant constructed by Briggs Manufacturing Company at Detroit in 1937. One of these Lorains recently completed a sewer ditching job for the Bohn Aluminum Company at Adrian, Michigan. Basement excavation for the new Salvation Army building in Detroit was handled in six days by the Laramie ¾-yard Northwest dragshovel.

Firm Started in 1917

In 1917 the purchase of a ¾-yard Thew steam shovel by Morris G. Laramie marked the beginning of the present firm. Upon arrival in Detroit the Thew steamer was put to work for the James Black Construction Company, on the new main office of the Michigan Bell Telephone Company, 1365 Cass Avenue, Detroit. From there a job was obtained for it at the new River Rouge plant of the Ford Motor Company, and shortly a second Thew was purchased and also put to work on the Ford Motor job. These two machines were employed on this job for over a year and were eventually removed on account of the demand for their services on other work at higher prices than could be obtained on the Ford Motor job.

One Thew went to a gravel pit and worked there for approximately one year. Shortly after this the two Thew steamers were sold and four new Erie wheel shovels were purchased. As busi-

ness increased, this fleet was increased to seven. Later the machines were modernized by the purchase and installation of caterpillar equipment and the fleet was further increased by the purchase of additional Eries by Morris G. Laramie, Orville A. Laramie, Stanley E. Laramie and Clifford E. Laramie, the three latter being brothers of the founder who had later become associated with him, each operating his own equipment from a common office.

A total of 26 steam shovels were purchased up to 1929, when two were added, as well as a Model 1030 Bucyrus-Erie gas crane purchased in 1928.

In 1930 the three brothers sold their equipment to Morris G. Laramie and at the end of 1930 (December) the business was incorporated as Morris G. Laramie, Inc. At this time the equipment consisted of one gasoline 1030 Crane and 18 Erie Steam shovels and cranes as well as four heavy duty trailers and three trucks.

During the period from 1929 to 1935 the business was carried on at a heavy loss but continued to get its share of what little work was being done.

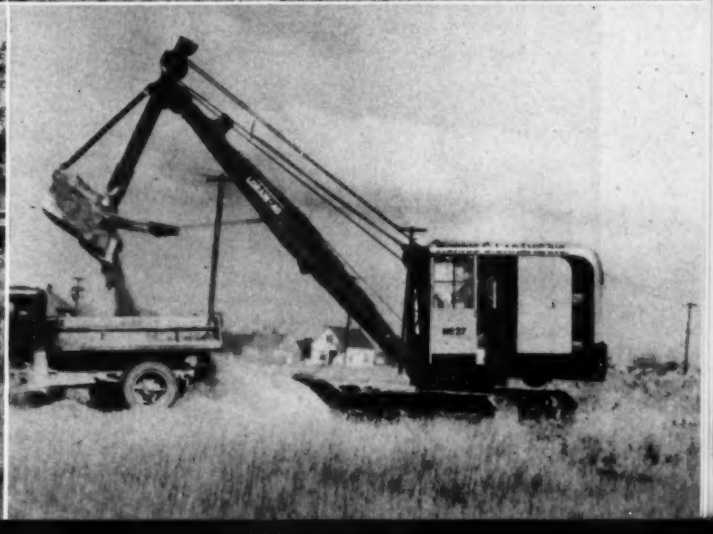
New Homes Stimulate Laramie Business

In 1936 the building of homes was greatly stimulated by the Federal Home Loan program and excavating for new homes became the major source of employment for the Laramie equipment. However, early in the following year it became apparent that in order to maintain their position it would be necessary to modernize again and accordingly a 19-B Bucyrus-Erie dragshovel was purchased in May. This was followed by the purchase of two Lorain 40's in July and October and a 20-B Bucyrus-Erie in 1938. A Northwest was purchased in February 1939.

During the spring of 1939 owing to the increasing stringency of State and County inspection on the highways, it became necessary to modernize the firm's moving equipment. One truck was converted into a tractor, a Rogers 25 ton pneumatic-tired semi trailer was purchased, and one of the old trailers was cut down from twelve to nine feet to meet the new highway laws.

In May, 1939, Gordon F. Laramie, who had been operating independently, amalgamated with Morris G. Laramie, Inc., and the firm name was changed to Morris G. Laramie & Son, Inc. This merger added two Model 25 Northwest dragshovels, one tractor and a Rogers 20 ton pneumatic tired semi trailer to the firm's equipment.

● Top: Mounted on a Rogers trailer this Northwest is on its way to the next job. Bottom, right: One of the Lorain 40's digging sand fill for a new plant in Detroit. Left: The Bucyrus-Erie 19-B works on a small basement excavation.



Small Shovels

SPEED TRANSMISSION LINE CONSTRUCTION

Contractors on the Bonneville Dam power line job use four 3/8-yard shovels with various front ends to solve the problems of on-the-job mobility and adaptability

By HENRY W. YOUNG

NERVE CENTER of the huge Bonneville Dam is the network of transmission lines now under construction. A considerable amount of excavation work is necessary in the installation of the steel towers supporting the lines. Digging small, scattered excavations of this type called for light, flexible, easy-to-move shovels.

Four transmission lines are now under contract. One is the 220,000 volt, two-circuit line from Bonneville Dam to Vaucouver, Washington, just across the Columbia River from Portland, Oregon. This line is 37.5 miles long and is known to Bonneville Project engineers as the "backbone line." A short line is being built from Vancouver to Portland, and including the river crossing is 3.5 miles long, supported by 18 towers. A third line, recently awarded will connect Bonneville and Grand Coulee Dams. Supported by steel towers this $947,000 line will be able to carry 220,000 volts 235 miles. These three contracts are being executed by Fritz Ziebarth, electrical contractor of Long Beach, California, with M. A. Pithoud, superintendent in charge. The Salem Sand & Gravel Company, Salem, Oregon, holds sub contracts for excavation of the tower footings on the first two contracts. Total excavation

● Perched on a hilltop this 10-B dragshovel is busy on a Salem Sand and Gravel Company Contract near Bonneville Dam.

on the two is about 30,000 cubic yards.

The fourth contract, held by the Parker-Schram Company, Portland, calls for a wood pole line, to transmit 110,000 volts from Portland to Eugene, Oregon. There are two crossings over the Willamette River in connection with this line, involving steel towers, at Harrisburg and Spong's Landing.

Another line planned for the immediate future, but not yet under contract, will run from Vancouver to Aberdeen, Washington.

Various Front Ends Used

Four Bucyrus-Erie 10-B's are on the job. One, a dragshovel, is working on the Vancouver-Bonneville line, one is on the Willamette River crossing and a third, a dragline, on the Vancouver-Portland cross-over line. All three are operated by the Salem Sand & Gravel Company.

The fourth shovel has been leased by the Bonneville Project from Henry Kuckenburg, of Portland, and is being used at the Vancouver materials yard, for unloading steel from cars and storing it in the yard. The 10-B has been found particularly fast, efficient and flexible for this unloading work. The heavy pieces are lifted from the car by the shovel boom and the rig then runs direct to the piles several hundred feet away. Lighter pieces, in bundles are lifted by the rig from car to truck. George Price, foreman in charge, reports that in one 8-hour shift they were able to unload and place 120 tons of steel.

One of the illustrations shows the 10-B just starting an excavation for a tower on the Bonneville-Vancouver line. From the start, it has demonstrated that a light, fast shovel can make the four excavations for the four tower leg foundations and then move on to the next tower site in remarkably short time.

Dragshovel Preferred on Job

M. A. Pithoud, superintendent for Fritz Ziebarth, expressed his preference for dragshovels on this type of job and stated:

"The dragshovel seems to be the answer to speed and economical excavation on transmission

(*Continued on page 480*)

● **Top: The start of construction on the first Bonneville transmission line was attended by: left to right, Fritz Ziebarth, general contractor, Charles E. Carey, acting Bonneville administrator, and A. N. Stanley, Mayor of Vancouver. Center: Using a dragline on a mucky foundation hole. Bottom: Digging tower foundation for the Bonneville-Vancouver "backbone" line.**

EXCAVATING ENGINEER

FOUNDED 1905

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

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May Construction Contracts Highest Since 1930

New construction and engineering work undertaken during May attained the highest level for any May since 1930. Total contracts for May, 1939 amounted to $308,487,000 for the 37 Eastern States, according to F. W. Dodge Corporation. This total represents a gain of 9 per cent over May of last year, but shows a decline of 7 per cent from April of this year.

According to Thomas S. Holden, vice-president in charge of the Statistical and Research Division of F. W. Dodge Corporation, the most significant development in the May contract record occurred in private construction which has shown marked increases since the beginning of this year. Mr. Holden stated that privately-owned construction for May totaled $173,730,000, which was 25 per cent ahead of last year and 2 per cent above the April, 1939 figure. For the first five months of this year, this class of construction is 36 per cent ahead of the same period last year. With the final passage of the amendments to the National Housing Act, the confusion and uncertainty existing this Spring should now permit private construction to proceed at a pace well ahead of last year.

Further evidence of the generally firm tone to the private construction record during the past few months appears in the increasing proportion which this class has contributed to the total construction record. In January, for example, private work represented only 41 per cent of total construction; in February the proportion rose to 50 per cent; while for May, private work contributed 56 per cent of all construction. For May of last year only 49 per cent of all construction represented private work.

May contracts for total building, comprising residential and non-residential work, amounted to $210,567,000 as compared with $209,061,000 for April and $160,924,000 for May of last year. Contemplated projects for all classes of construction totaled $414,486,000 for May.

Business System Editorials

Reprints of the series of twelve editorials, based on S. D. Warren Company bulletins, are still available. The editorials are:

Who Are Business Men?
Building a Business
When A Business Grows
Who Puts Up the Money?
Who Owns Business?
Should Business be Big or Little?
Who Pays the Taxes?
Who Determines the Wages of Employees?
What Is Management?
The Competitive System
Good Times and Bad Times
Add Up the Score

Reprints of these editorials are one cent per copy in lots of ten. Orders for ten copies of a single reprint are the smallest we can handle. If you desire to have the whole series, send $1.20 and we will forward ten copies each of the twelve editorials listed above.

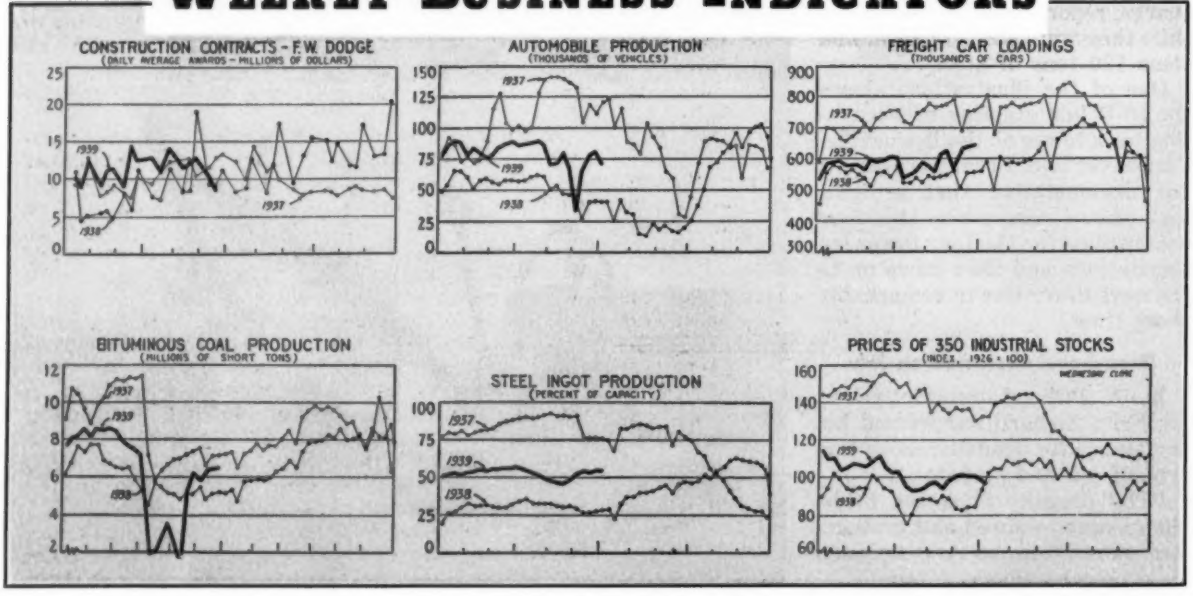
These reprints are offered at cost for the purpose of distribution to friends or employees. Orders should be addressed to EXCAVATING ENGINEER, South Milwaukee, Wisconsin.

Highway User Taxation

A recent report of the Federation of Tax Administrators shows that motor fuel taxes represented 29 per cent, and registration fees 9.5 per cent, of all revenues collected from state taxes during 1937. Combined, these two special taxes, collected almost solely from the highway user, represented approximately

(Continued on page 480)

WEEKLY BUSINESS INDICATORS



" RESOLVED . . . "

Editor's Note: The following resolution was adopted by the Associated Equipment Distributors during their annual convention at San Francisco, California, March 4-6, 1939.

THE Associated Equipment Distributors in annual convention assembled March fourth to sixth, 1939, at San Francisco, California, discussed the subject of trade publications using in their magazines, articles and pictures of road building and maintenance equipment, built with tax funds by various political subdivisions. At a joint meeting with manufacturers of road building and maintenance equipment, the question was generally discussed and it was unanimously ordered that a resolution be prepared and sent to all construction trade journals.

RESOLVED, that the practice of political subdivisions constructing their own road building and maintenance equipment is generally not economical, but more expensive than buying through established distributors equipment made by experienced and recognized manufacturers, for the following reasons:

1. **The development and experimental cost can be spread over hundreds of machines instead of one or two.**
2. **The repair and upkeep cost is less because the manufacturer produces repairs on a quantity basis for hundreds of machines.**
3. **The manufacturer can get new ideas for improvement from experiences all over the country and under varying conditions, while in most cases the political subdivision and their local shops have only their own experience to go by.**
4. **The established distributor can give splendid service and advice from his experiences on numerous construction jobs and various types of work that the equipment will do.**

AND BE IT FURTHER RESOLVED, that the various trade journals be sent a copy of this resolution and requested to discourage the cut and fit experiment and costly methods of small shops, or by political subdivisions trying to experiment and construct their own equipment in small quantities for their needs. The trade journals can best serve the construction industry by confining their articles to the performance of established and well known equipment and its performance on the construction job, and thereby create a reader interest in their publications, and through this type of article carry information to the equipment user which will enable him to keep up with the new developments in equipment that have been brought about through the experimental work and development by the manufacturer, and the tried and proven equipment offered by the established distributor.

RESOLUTION COMMITTEE: F. B. McBath; S. F. Beatty, Jr.; Andy Anderson.

Excavating Engineer heartily agrees with the principles of the resolution adopted by the Associated Equipment Distributors. Its constant aim has been to bring to the attention of contractors the money-making possibilities of using modern equipment as well as modern methods in dirt moving operations.

It is quite evident that development of equipment by local political subdivisions is neither economical nor efficient. The major faults of this plan are excellently summed up in the four points of the resolution.

Constant experimentation is necessary to the sound development of any piece of equipment. This experimentation, though costly, is necessary to the efficiency of the equipment. When this extra cost must be absorbed by one or two machines instead of several hundred it is quite evident that the unit cost of the locally devised machine will be unnecessarily high.

Repair and upkeep soon follow the original investment and here again it is a matter of producing repair parts on a quantity basis or the slow, costly method of limited local experimentation.

The manufacturer's machines go to a wide and varied market. Their finished product represents the total experience of many requirements under many different conditions. The locally devised machine does not have the advantage of this wide manufacturing experience and so is limited in its ultimate efficiency.

Experienced service is another important factor that is lacking in the local set up. The combined experience and facilities of the manufacturer and established distributor are job insurance against costly delays resulting from breakdowns and operating problems. It is obvious that a locally controlled shop would be limited in its ability to cope with an emergency of this type.

Excavating Engineer recognizes the fact that new ideas are not limited to the manufacturer alone and it is on this point only that we feel that local experimentation cannot be entirely overlooked. In the interests of our readers we will continue to publish new developments in the excavating industry regardless of their origin. It is our feeling that any new idea, if successful, will sooner or later enter the regular manufacturing channels.

We think that the points in the Associated Equipment Distributors' resolution are well taken and we are glad of this opportunity to publish them.

—The Editor

1881

1939

Wm. H. Gallagher, Jr.

A GREAT LOSS to the mining industry was marked by the wholly unexpected death of William H. Gallagher, Jr., on July 1 at Saginaw, Michigan, while on vacation with his family.

Mr. Gallagher died in a Saginaw hospital where he had gone for rest and observation after a sudden illness. He experienced a sinking spell at the hospital from which he did not rally.

At the time of his death Mr. Gallagher was active as the chief mining and electrical engineer for Pickands, Mather and Company and made his home in Duluth, Minnesota. He had the distinction of being one of the most prominent mechanical and electrical engineers in the Lake Superior district.

Born September 1, 1881, at Adrian, Michigan, Mr. Gallagher received his formal education at Cornell University where he graduated in 1906 as a mechanical engineer. Upon his graduation he joined the staff of the Cleveland Cliffs Iron Company and continued in their employ until 1916.

In 1917 Mr. Gallagher married Miss Hilary Brady of Saginaw.

After a year in the copper country of Michigan Mr. Gallagher became connected with the Pickands, Mather and Company. Although constantly active in mining affairs he found time to be a member of the Duluth Chamber of Commerce, the Northland Country Club and Lake Superior Mining Institute.

His many associates and friends in the mining industry will long remember Mr. Gallagher for his clean cut personality, his friendly manner, and boundless good humor. Mr. Gallagher was a man of great originality and industry who pyramided his achievements in the mining industry field. Although he had not yet arrived at the peak of his productive ability Mr. Gallagher was already widely recognized for his many accomplishments.

The funeral was held July 5 from St. Paul's Episcopal church in Duluth where Mr. Gallagher had long been a prominent member. Services were conducted by the pastor, Rev. Lloyd R. Gillmett. W. A. Rose of Pickands, Mather and Company came from Cleveland to attend the funeral. Pallbearers were W. A. Rose, W. F. Arndt, Earl Farnam, Lawrence Bowman, Rollo Hunt and Walter Trenerry.

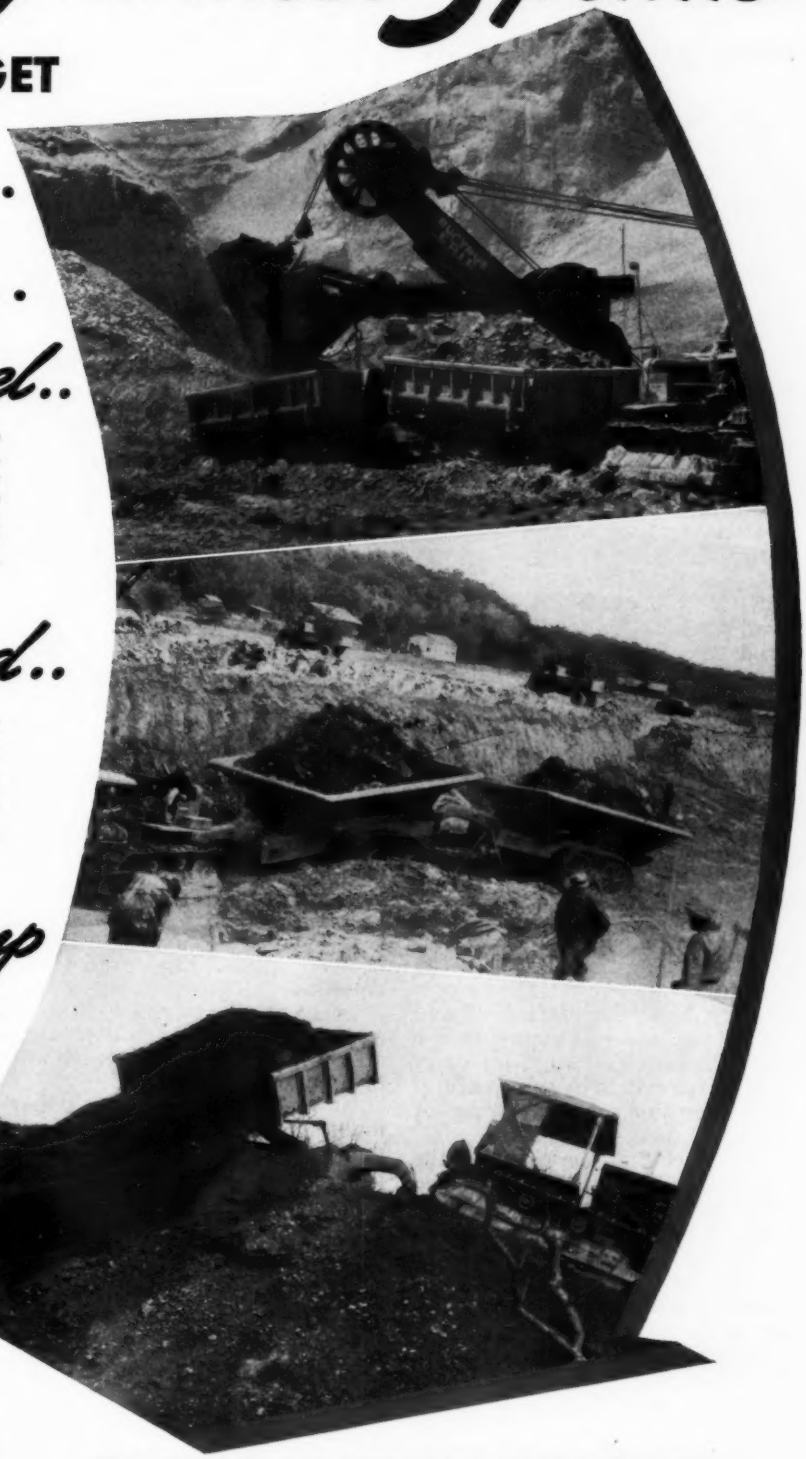
Mr. Gallagher is survived by his wife and three daughters, Phyllis Ann, Alice and Margaret.

Lick delay at these 3 points

AND YOU'LL GET

MORE SPEED . .

MORE PROFIT . .



☆ *at the shovel . .*

Minutes lost at the shovel can pile up into hours and days lost on the job. Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel tractors, lose NO time in maneuvering—can turn at a right angle—require NO "time out" for cleaning up loader spill. *Load without delay and you step up profits.*

☆ *on the road . .*

Rubber-tired vehicles get mired—slip on greasy clay—cut tires on sharp rocks, too. There's NO miring with Athey Forged-Trak Trailers—you don't have to wait for just the right ground conditions—and there's NO hazard from sharp rocks. *Consistent roading speed steps up your profits.*

☆ *at the dump*

Are you wasting time with hauling units that get stuck on the dump—that can't crowd right up to the edge of fill? You'll have NO such delays with Athey Forged-Trak Trailers—they climb right over the dump—up to the edge of the fill—dump quickly and cleanly. *Speed up the job and you speed up profits.*

See your "Caterpillar" dealer or write

ATHEY TRUSS WHEEL CO.
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Cable Address: "Trusswheel," Chicago

ATHEY

SEE YOUR "CATERPILLAR" DEALER

FORGED-TRAK TRAILERS

For your convenience in writing to Athey Truss Wheel Co., you will find a card bound in this issue.

Field NOTES

Dredging Contractor Defeats Slide Suit

By Arthur L. H. Street

The defendant, a dredging company, was employed by Uncle Sam to remove material from the Chesapeake and Delaware Canal by the hydraulic process. The Government provided an area for deposit of the dredged material along a creek, opposite land used by plaintiffs for commercial fishing purposes. Other dredged material had been placed previously on the same area.

Suddenly, a section of an embankment along the creek, supporting the deposited material slid into the creek, blocking rowboat navigation on the creek to plaintiffs' damage. They sued the company on the ground that their damage was caused by the company's negligent handling of the dredged material.

In the case of Toy vs. Atlantic Gulf & Pacific Company, 4 Atl. 2d, 757, the Maryland Court of Appeals decided that there was no basis for holding the company liable. Here are the high spots of the court's opinion:

The mere happening of the accident does not show the dredging company was negligent.

Although the precise cause of the slide was not shown, the fact that the slide originated in the embankment, where material previously had been deposited and not in the material placed on top by defendant company, indicates that it was caused by some natural force, erosion or burrowing of animals.

The fact that the cause of the slide could not be established after a trial shows that the company was not negligent in not foreseeing what happened.

"The area for the deposit of the material dredged was the property of the government which was responsible for its condition at the time the work began. What was done and when it was done by the defendant was under the supervision and control of the government. It was, therefore, authorized. It was not negligent since *the defendant neither saw nor knew nor was put on notice of any weakness or instability in the embankment, but had every reason to rely with confidence upon its apparent security by reason of the expert qualifications of the government's engineers in charge and the length of time the embankment had held its form and position.*"

A reference to the decision in this case deserves to be pasted in every dredging contractor's hat, Bible or other place where it readily can be found, because it takes its place as the leading court decision on the subject of a dredging contractor's liability for losses incidently sustained by nearby property owners where deposited material slides. But the contractor must not overlook the intimations of the decision, to the effect that if he deposits materials in a place where he knows or ought to know that a slide may occur, or fails to deposit them in a manner approved by standard practices, he could be held liable for losses that he should have foreseen might result.

Logarithmic Scale for Excavating Estimations

Most excavating engineers doubtless use the slide rule which is made up of logarithmic scales, and therefore are familiar with the advantages of logarithmic methods.

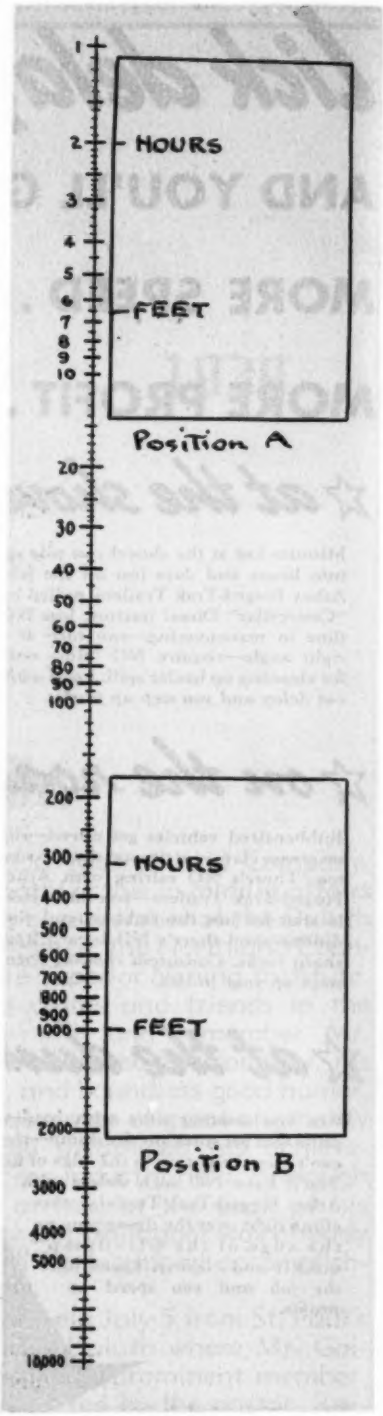
However, I doubt whether many excavating engineers have made up long special scales along the line of the accompanying sketch. Such a scale placed permanently in a convenient place will be found handy for many proportioning jobs.

For example, let us say that you are excavating a ditch and you find that you can do 6½ feet in two hours.

Take a slip of paper and place it in position "A". Opposite the 2 write "hours," and opposite the 6½ write "feet."

You can now move that slip of paper to any position on the scale and it will immediately give you the number of hours required to do any number of feet. Thus, for instance, in position "B" the scale shows that you can do 1,000 feet in 308 hours.

Because of the space limitations of this page the scale has been made short, being limited from 1 to 10,000. It will be noted that the distances from 1 to 10, 10 to 100, 100 to 1000, and 1000 to 10,-



● Clip this sketch of the scale and mount it on cardboard. You will find it a handy aid in estimating your time requirements.

COSTS TAKE A TRIMMING

WHEN "CATERPILLAR" DIESELS TAKE A HAND!

A "Caterpillar" Diesel Tractor teamed with a LeTourneau Buggy. This outfit, working on a road contract near Frederick, Maryland, is owned by Harry T. Campbell.

THERE'S NOT a thing you need for a *low* cost-per-yard that a "Caterpillar" Diesel Tractor hasn't got!

Take its tracks, for example. Long, wide, and deep-grousered, they enable you to move your loads over any ground—*in any weather*—and make time doing it! They help this tractor to respond quickly to the operator's orders when it comes to spotting the wagon under the shovel. And they've got a lifetime of long service in their heat-treated steel!

Now consider your *saving of actual money* on fuel . . . and the all-around stamina and precision-build of a "Caterpillar" Diesel that saves both time and money on repairs. And then you've got an *additional saving of time* when you do come up against maintenance-needs. Because no matter where you go to work, you *can't get far* from "Caterpillar" parts-and-service facilities. They're the *widest spread* and *most complete facilities* of their kind in the world!

Power . . . traction . . . fuel-economy . . . dependability . . . and service *when* you need service. Those are the things a "Caterpillar" Diesel has to *trim your hauling-costs!* See your "Caterpillar" dealer, or write direct for more information.

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DIESEL ENGINES
TRACK-TYPE TRACTORS
ROAD MACHINERY

● This large field repair job was handled while the contractor was working on the All-American Canal.

000 are all equal and all divided in the same way. By extending these divisions making them all the same length and dividing in the same way, it is possible to go into the millions or billions and in the other direction down into decimals.

Obviously, one of the important advantages of this scale after it is once made up is that there is no possibility of making a mistake due to misplacing the decimal point.—*W. E. Schaphorst, M. E.*

Renewing a Bucket Lip

In repairing the lip of a dragline bucket, a contractor on the All-American Canal found it necessary to cut away 10 inches of the worn lip and replace it with a new strip of mild steel, butt welded to the old bottom. Outside of this, and overlapping it about 6 inches, a 2-inch by 16-inch mild steel plate reaching the width of the lip was welded in place, after the main portion had been bent cold in a 300 ton press, using 110 pound pressure, to a 15-inch radius. The ends were then heated, one at a time, with a torch and bent into place. Heating, bending and fitting required 11 hours.

In order to bring the main part of the bucket bottom and the new steel together properly while welding, an inverted L or 6-inch angle, 3 feet long, was tack welded to the bottom and a 15 ton jack set under the short end of the L and on top of the new plate. After this outer bead was run the hold down was removed and the bucket stood on end with a derrick. The welds at the ends of the new plate, and on the inside, were then completed and the point of the new lip, for 1¾-inches back, were laid with Weldite 3/16 rod. Behind that a strip of ¾-inch cast iron, 4½-inches wide, was welded in place. The bucket bottom was extended over the outside of the new lip by welding in a 6-inch strip of hard plate.—*Jos. C. Coyle.*

Quarry Loses Decision

New Jersey's Chancery Court has ruled that persons who move into a neighborhood where a quarry has been operating for years are nevertheless entitled to relief if the conduct of the business constitutes a nuisance.

This point was made by Vice Chancellor Alfred A. Stein in an opinion at Newark, May 18, explaining why a month earlier he temporarily restrained the Kernan quarry, South Orange, from blasting heavily enough to cause vibration or damage to residences in and near Wyoming avenue, South Orange.

One of the arguments brought out by the defense had been that most of the 48 residents and property owners who were complainants had moved to the section in 1931, after the quarry had been operating there for years.

Stein quoted with approval an old case which stated: "If population, where there was none before, approaches a nuisance, it is the duty of those liable at once to put an end to it. It would be most inconsiderate to hold that, having submitted for some years, they must patiently submit so long as the defendant sees fit to impose upon them. Every day's continuance is a fresh nuisance."

The court added: "If the business of defendants cannot be operated without causing vibration resulting in damage to the property of complainants, there is no right in defendants to continue their business."

Protective Flare Pot Holder

It is often necessary to set common flare pots on concrete and other surfaces where they frequently leave unsightly spots hard to remove. Usually rain washes wick residue down over the sides of the ball shaped container which is hard to keep clean as it is constantly exposed to grease, tar, etc.

To make the holder, coil a short piece of common leather belting and tie the ends. Fill this with ordinary building sand as shown and set the pot in it. The danger of the pot accidently tipping or rolling is greatly lessened, it also absorbs any oily residue, and is quickly removed when the pot is no longer necessary on the particular spot. The clean sand will leave no unsightly place on any surface. Small metal barrel hoops can be used in the same manner to hold the protective sand and keep it from washing away even in a heavy rain.—*Frank W. Bently.*

● A surface protecting flare holder that also acts as a firm, non-tipable base for the flare.

New "RPM" DELO

[Diesel Engine Lubricating Oil]

WILL CUT YOUR DIESEL OPERATING COSTS

NEW "RPM" DELO which prevents ring-sticking and reduces filter-clogging to a remarkable degree, positively will not corrode or impair ANY type of Diesel engine bearings.

This has been proved by rigorous tests covering millions of miles of engine operation. The unvarying result is: NEW "RPM" DELO keeps *all* types of bearings in perfect condition!

Ask our Representative or your nearest Distributor to show you the authoritative Engineers' Report on NEW "RPM" DELO. This will give you the full results of our 10,000,000 miles and 90,000 hours of testing. By every test NEW "RPM" DELO assures clean-engine operation—free rings, clean pistons and cylinders, free oil passages, clean filters. Fact is, in a grueling test with NEW "RPM" DELO, engine filters remained free and unclogged after operating *6 times longer* than was possible with the highest quality straight mineral oil!

Yes, NEW "RPM" DELO spells *absolutely correct lubrication* for every type of Diesel engine, stationary or mobile, ashore or afloat. Cash in on all its service advantages yourself.

NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

Order from Your Nearest Distributor as Listed Below:

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"RPM" Diesel Engine Lubricating Oil:
The California Company (Montana only)
Humble Oil & Refining Company
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Standard Oil Company of California
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Standard Oil Company of New Jersey
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"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries. Get in touch with your nearest distributor.

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Equipment

you ought to KNOW ABOUT

Rotavator on Crushing Plant

The Universal Crusher Company, Cedar Rapids, Iowa, has introduced a new model Dual Crushing Plant in which the belt conveyor return system, for feeding back material from both the primary jaw crusher and the secondary crushing rolls, has been replaced by a new turbine type revolving elevator called the Rota-

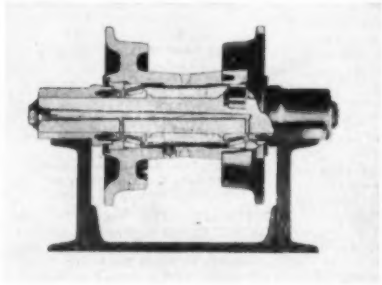
vator which conveys material discharged into it by the under crusher return conveyor to the screen feed conveyor directly above the latter.

The savings in weight and overall length and width that result from the use of the Rotavator provide a far lighter, more profitable unit and actually shortens the cycle, speeding up production, according to the manufacturer.

Allis-Chalmers Track Roller

A new, Positive-Seal truck wheel assembly for tractors, which will eliminate daily roller greasing, has just been announced by Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin.

In this new truck wheel assembly, ordinary bearings are re-



placed by tapered roller bearings with a positive-seal arrangement that keeps in lubricating oil and keeps out dirt, dust, mud and grit. Lubrication, according to Allis-Chalmers engineers, is required only once every 200 operating hours instead of every 8 hours as heretofore.

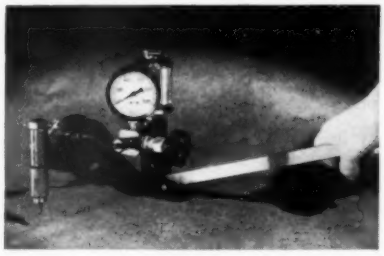
At present this new truck wheel is available on Allis-Chalmers tractor models "M," "K," "K-O," "S," and "S-O."

"Surfaceweld A"

Produced by The Lincoln Electric Company, Cleveland, Ohio, "Surfaceweld A" is a fine grained alloyed powder to be applied with the carbon arc. The manufacturers claim it gives a smooth dense hard surface that is abrasion resistant. It can be applied in very thin and extremely smooth layers.

Fuel Injection Test Pump

A compact, portable hand pump for testing Diesel fuel injectors in the field is now being made by Diesel Equipment Corporation, 4401 N. Ravenswood Avenue, Chicago, Illinois. It is designed to

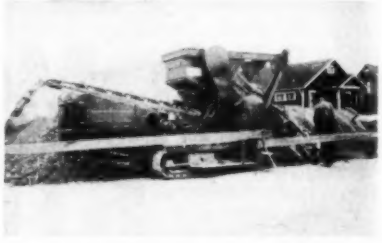


permit the user to check all size injectors of all standard makes, including Deco, Timken, Bendix, Bosch, Caterpillar, Hesselman, International and others. So simple is its use according to the manufacturer, that testing the adjustment of fuel injection systems can be made a routine service job like greasing and oiling.

Improved Pioneer Trencher

Through improvements recently made, the Cleveland Pioneer Trencher Model 170 has increased its productive ability in digging the deeper trench for water and sewer lines 21 to 30 inches wide and up to 10 feet deep. This machine, manufactured by The Cleveland Trencher Company, 20100 St. Clair Avenue, Cleveland, Ohio, has been redesigned to give a more advantageous distribution of weight which has resulted in a better balanced unit, it is claimed.

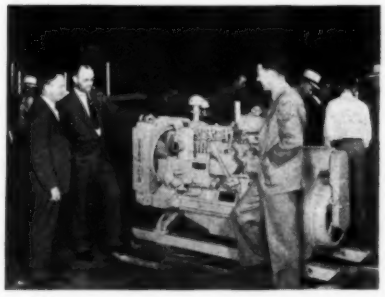
An important improvement is the grouping of all controls immediately in front of the operator,



at the digging end of the machine, so that he can keep his eyes on the work he is doing in the trench at all times. This Trencher, according to the manufacturer, is capable of digging over 22 feet per minute where formerly its top speed was 12 feet per minute.

New Diesel Electric Sets

Two new, completely self-contained diesel electric sets, designed to bring low cost lighting and power to construction jobs the world over, have just been announced by the Caterpillar Tractor Co., Peoria, Illinois. The actual installation is simple for the only wire connections to be made are from the generator terminal to a circuit breaker, and from the circuit breaker to the distribution box. The light weight sets need no special bases, but can be set down anywhere and put to work. All electrical equipment required by the 15 and 20 kilowatt sets is inbuilt, with the exception of the



circuit breaker, according to company engineers.

According to the manufacturer,

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

uses for the new power packages in the construction field, are widely varied. In construction camps, they can pump water, and provide current for refrigeration, lights, radio, small tools, grinders, bunkhouse, shop, commissary, office and street. They can be used to floodlight large operations, handle small miscellaneous loads and make life comfortable on dredges, operate floodlights and welders on large draglines, etc.

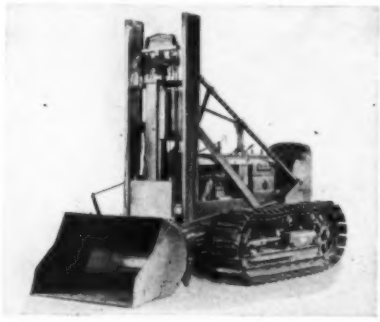
New 3½-S Kwik Mix

The outstanding feature of the new non-tilt 3½-S Trail-Mix, produced by the Kwik Mix Concrete Mixer Company of Milwaukee, Wisconsin, is the absence of a drum ring gear, drum drive pinion and countershaft.

The drum is driven by the rubber drum rollers, reducing noise, vibration and excessive maintenance costs, according to the manufacturer. Other features of this mixer are: low shoveling height, wide hopper, fast discharge, weighs 980 pounds and can be handled by one man. A bulletin is available.

Tractor Shovel

The Frank G. Hough Company announce the Special-Modified International T-35 and TD-35 Tractor Shovels. These new shovel models are built around Special



T-35 and TD-35 Tractors which have been modified especially for shovel service.

Hough Tractor Shovels, made in wheel and crawler tractor models, can, according to the manufacturer, handle loose and bulky materials of all kinds, load trucks and wagons, dig basements and pits and handle materials from stock piles and storage bins.

Lightweight Generating Plants

A complete new series of extremely lightweight, Aircraft Type Electric Generating plants have been announced by D. W. Onan and Sons, Minneapolis, Minnesota. The plants output range from 1000 to 7500 watts in Models—OTA, OTC and OTD. There are various voltages, 50 to 800 cycle Alternating Current or Direct Current. These plants are standardized in their construction, and a series of 21 different types of generators and control systems can be supplied on each of the three Models.

Brake Block Conducts Heat

The unique quality of conducting heat is claimed for an improved moulded asbestos brake block announced by the Gatke Corporation, 228 N. La Salle St., Chicago.

In more than a year's actual service on tough test applications Gatke 445 Moulded, as this improved brake block is called, has

demonstrated the ability to retain uniformly great holding power at all operating temperatures with positive pick-up and smooth release under all conditions, according to the manufacturer.

Airflex Rubber Clutch

The same engineering principle that today is preventing thousands of motorcars from skidding on wet and slippery pavements has made possible a new type of mechanical clutch, according to an announcement of the General Tire & Rubber Co., Akron, Ohio. Adhesion being the principal job of a clutch, no matter where it may be used, it was only a step from the multi-vaned tire that

clings to the pavement to the Airflex rubber clutch, whose multi-vaned surface clings to steel with twice the friction co-efficient of asbestos or other conventional clutch lining, it is claimed.

Because of the flexibility in the application of its pressure, the Airflex clutch provides uniform pressure on every inch of surface, and for the same reason, the clutch has many of the properties of a coupling when it is engaged, and can take care of a reasonable amount of angularity and misalignment, according to the manufacturer.

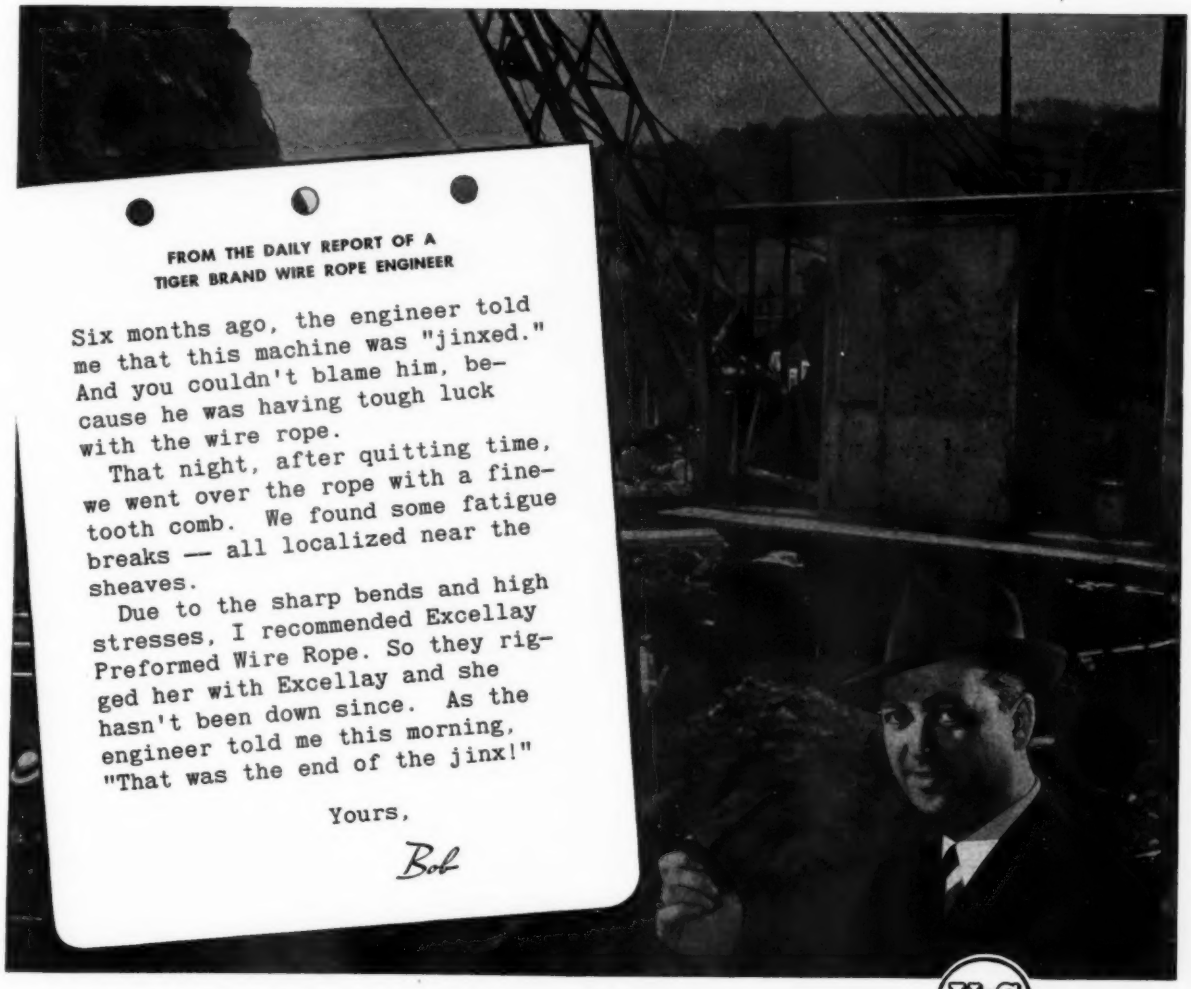
Licenses for the distribution of the Airflex marine type clutch have been granted to the Falk Corporation of Milwaukee, Wisconsin.

Kennametal for Pump Valves

Pump valves and other valves subject to unusual abrasive or corrosive action are now being made of Kennametal, the new intermetallic compound of tungsten-titanium carbide, manufactured by McKenna Metals Co., 243 Lloyd Ave., Latrobe, Pa.

Recent tests indicate that, according to the manufacturer, valves made of Kennametal will far outlast valves made of other materials. Kennametal can be supplied in any desired shape for valve parts and in three grades having varying physical properties. Complete information on Kennametal balls for ball valves will be sent by the manufacturer upon request.

. . . SO THEY RIGGED HER WITH EXCELLAY AND ENDED THE JINX!


FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
Six months ago, the engineer told me that this machine was "jinxed." And you couldn't blame him, because he was having tough luck with the wire rope.
That night, after quitting time, we went over the rope with a fine-tooth comb. We found some fatigue breaks — all localized near the sheaves.
Due to the sharp bends and high stresses, I recommended Excellay Preformed Wire Rope. So they rigged her with Excellay and she hasn't been down since. As the engineer told me this morning, "That was the end of the jinx!"
Yours,
Bob

NO one could be better qualified to help you get real performance out of wire rope than the American Tiger Brand Wire Rope Engineers. For besides knowing wire rope, inside and out, these men know exactly what punishment it has to take on construction jobs. Putting the right type of rope where it will do the most good is no trick to them, because they spend most of their time doing just that.

The result: When you turn your wire rope problems over to them, you get the most practical solution—and what's more, you get it in a hurry.

Be sure to take full advantage of the wide experience of these engineers. They can help you out of many a tight spot, with just the kind of service you need. American Tiger Brand Wire Rope is made in all constructions and grades — every one just as high in quality and technically sound as the men who represent this product.

EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

For your convenience in writing to United States Steel Corporation Subsidiaries, you will find a card bound in this issue.

NOT in the Contract

Mrs. Henpecked (sarcastically): "I suppose you've been to see a sick friend—holding his hand all evening?"

Husband (absently): "If I'd been holding his hand, I'd have made money!"

1st Operator—How are the girls in this town?

2nd Operator—Some are pretty good, some are pretty bad.

1st Operator—Well, I guess I'll have to take the good with the bad.

2nd Operator—Gosh, no, when you take the bad, you want to be alone.

Johnnie: "How many kinds of milk are there?"

Father: "Why, there is condensed milk, evaporated milk, sweet milk, and buttermilk, but why do you ask?"

Johnnie: "Well, I am trying to draw a cow and I wanted to know how many spigots I should put on."

"To what do you attribute your great age?" asked the city visitor of Grandpa Elben Hoskins.

"I can't say, yit," said Grandpa cautiously, "There's several of them testimonial fellers adickerin with me."

"He's gettin' in shape for the jitterbug contest tonight."

Seen in Print

Wanted—Waitress for cocktail room; blonde, young. $10 week, and nips permitted while serving.—San Francisco (Cal.) Valley News.

We may be too optimistic but it looks as if _____ _____, our community's most popular bachelor, is heated for the altar.—Charteris (N. Y.) Democrat.

Miss _____, noted trick rider and rodeo performer, will exhibit her elaborate silver-mounted prize waddle at the _____ Store all day Saturday. — Creighton (Cal.) Daily Mirror.

Agent—"Sir, I have something here which will make you popular, make your life happier, and bring you a host of new friends."

Shovel Runner — "I'll take a quart."

Co-ed: "I want a pair of bloomers to wear around my gymnasium."

Clerk (absently): "How large is your gymnasium?"

"Jim," said the taxi-driver's friend, "there's a purse lying in the bottom of your car."

"Hush!" said Jim. "I put it in there and leave the door open. You have no idea how many people will jump in for a short ride when they see it."

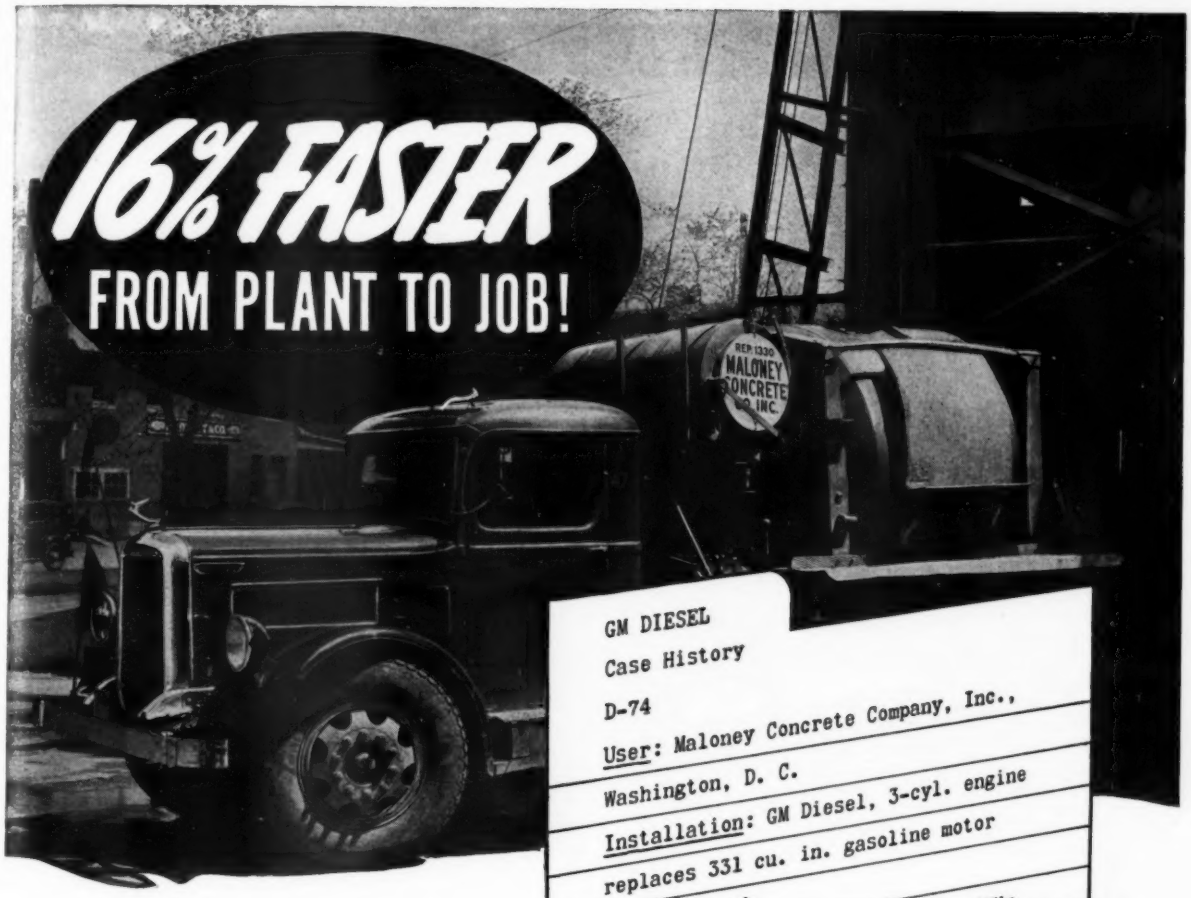
"Last summer in China I spent most of my afternoons in a shady spot in the country."

"Why, I didn't think those places opened up until evening."

A chip on the shoulder indicates there's wood higher up.

A panhandler was seen standing on the corner holding a hat in each hand. A stranger approached and asked what was the idea of two hats. The bum grinned:

"Business has been so good that I've opened a branch office."



GM DIESEL
Case History
D-74

User: Maloney Concrete Company, Inc., Washington, D. C.

Installation: GM Diesel, 3-cyl. engine replaces 331 cu. in. gasoline motor on 1936 truck.

Performance: 16% time saving on regular run, between plant and job.

—this Diesel adds a concrete profit to the savings it makes

ALL concrete is pretty much the same, and today's rock-bottom prices have practically eliminated the cost factor from competition.

That's where fast deliveries come in—get the *re-orders.*

And that's another way the GM Diesel is outperforming previous engines—gasoline engines included.

Just watch it highball through sand or mud—take the hills in higher gear—pick up with a snap out of hairpin bends—lug crushing loads through blistering heat with a miser's share of lube oil!

This same tank-like pulling power of the Dean of the Diesels is available for everything on construction jobs—on shovels, cranes, draglines, bulldozers and mixers. It responds to variable loads with a snap and alertness even gasoline engines can't match—yet "hangs on" with the tenacity of a steam engine.

Ruggedly built on the General Motors 2-cycle principle, its operation is simplified beyond need for "expert" operators and costly care—its resistance to wear vitally increased.

And all its wearing parts are standardized for quick, low-cost replacement. That completes the picture of Packaged Power, from 15 hp. up, ready to go—on all kinds of stationary and portable work.

The GM Diesel dealer near you can show you how, why, when and where it will fit in on *your* jobs.

Write or wire for his name and address.

GM GENERAL MOTORS DIESEL POWER

DIESEL ENGINE DIVISION
General Motors Sales Corporation
Cleveland, Ohio

☆ GENERAL MOTORS DIESEL ☆

SEE THE GENERAL MOTORS DIESEL EXHIBITS AT THE NEW YORK AND SAN FRANCISCO FAIRS

For your convenience in writing to General Motors Sales Corporation, you will find a card bound in this issue.

Shots from the FIRING LINE

Recent Pennsylvania Turnpike Awards

Among the contracts recently awarded by the Pennsylvania Turnpike Commission are the following eleven totaling $6,942,461 for 36.22 miles of grading, drainage and structural work on the 160-mile Turnpike.

The awards, subject to approval by PWA and RFC which are jointly financing construction of the superhighway, went to the low bidders as follows:

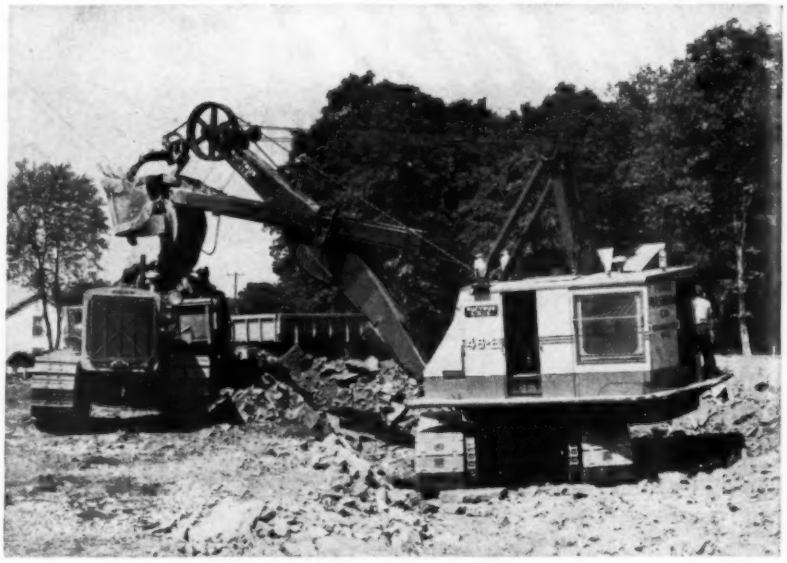
N. B. Putman Company, Harrisburg, $164,955.98 for 0.113 of a mile, grading and drainage, and six structures in Juniata and Napier townships, Bedford County. (Section 11B.) This firm was also awarded 6.7 miles of construction and paving on its bid of $1,135,691.

H. R. Dickens, Philadelphia, $138,466.87, for 0.28 of a mile, grading and drainage, in Stony Creek and Somerset townships, Somerset County. (Sections 8C1 and 9A1.)

Dalton Brothers, Inc., Paoli, Pennsylvania, $234,593, for 1.96 miles of grading and drainage in Dublin township, Fulton County. (Section 16B.)

H. W. Shaull & Son, Mechanicsburg, Pennsylvania, $287,833.77, for 4.92 miles of grading and drainage in Lurgan and Hopewell townships, Franklin and Cumberland Counties. (Sections 18A and 19C.)

Herman Holmes, of Crystal Falls, Michigan, $1,513,504.98, for grading and drainage and construction of 10 steel and reinforced concrete structures along 7.13 miles in Harrison, Napier and Bedford Townships, Bedford County. The contract involves heavy excavation including several cuts and fills between 50 and 70 feet deep. (Section 12A.)



● **Frank Mashuda of Milwaukee, Wisconsin, uses this 48-B shovel in handling heavy shale on his section of the $60,000,000 Pennsylvania Turnpike.**

Holt, McConnell & Osbourn, of Canonsburg, Pennsylvania, $52,222.74, for construction of a plate girder separation structure to carry the Turnpike under Legislative Route 29022 in Taylor Township, Fulton County. The project totals 0.34 of a mile. (Section 15B.)

Baldwin Brothers Paving Company, Cleveland, Ohio, $415,736.70, for 1.38 miles of grading, drainage and construction of a 240-foot viaduct at Arona, Westmoreland County, carrying the Turnpike over the Pennsylvania Railroad and Little Sewickley Creek. (Section 2C.)

Connell and Laub, Somerset, Pennsylvania, $642,295.94, for 2.75 miles of grading and drainage in Somerset Township, Somerset County, and construction of an I-beam bridge 110 feet long carrying the Turnpike over the B. & O. railroad just north of Somerset. (Section 8B1.)

Central Pennsylvania Quarry, Stripping and Construction Company, Hazleton, Pennsylvania, $1,561,920.63, for grading and drainage and erection of structures along 7.27 miles of roadway extending east from the Allegheny Mountain tunnel through Allegheny township, Somerset County, into Juniata Township, Bedford County. (Sections 9C2-10-11A.)

Nello L. Teer, Durham, North Carolina, $795,244.27, for 3.38 miles of grad-

● **Mrs. Bernice Skuba, wife of a Cook County, Illinois, highway official, hits the nail on the head as the Illinois Road Builders Association opens a state-wide drive to enlist support of motorists in fight against diversion of gasoline and motor license tax funds. Left to right: Carl M. Petersen, construction foreman; Alex Miller, resident engineer; Mrs. Skuba, Ralph R. Anderson, president of the Suburban Pavement & Improvement Company, and Taylor G. Soper, executive secretary of the I.R.B.A.**

Easiest Loading Scraper on the Market

A Canadian Contractor recently put a Bucyrus-Erie Scraper on the same job with a competing unit. He decided, after a few days trial, to allocate ALL the hard cutting to the Bucyrus-Erie.

Why? Because it was loading to capacity with only one tractor in material so hard the competing unit required the help of a pusher.

This is only one of many instances where Bucyrus-Erie has backed its claim to superior loading ability WITH OUTSTANDING PERFORMANCE ON ACTUAL JOBS.

For more information on this and other money-making features of Bucyrus-Erie Scrapers, get in touch with your nearest International Harvester TracTracTor Dealer.

P-39

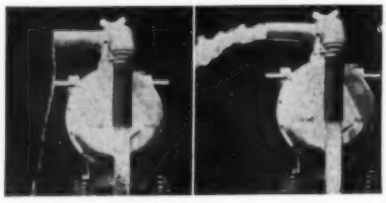
Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

Here's the Pump
for your kind of work

Goes Anywhere—Gets there fast. It's no trouble to get rid of water—**anywhere or anytime**—if you have a Homelite 3" Portable Pump. Small and compact—only 91 pounds complete with engine—it is rushed to the job easily in small truck or car or kept handy in tool box. It can be set up and started readily **by one man** in places that larger pumps couldn't reach.



Handles Seepage or a Flood. No job is too tough for a Homelite. It pumps 15,000 gallons of water and has the fastest automatic self-priming. Handles seepage in any amount and keeps it **always** at strainer level. Has a 28 foot suction lift and pumps against 70 foot heads.

Doesn't Clog. A Homelite passes 35% sand or other solids through its patented non-clogging, self-scouring body without trouble. Cleaning is unnecessary. And the complete unit is built for long life. Finest materials throughout. Absolutely weatherproof, waterproof, and foolproof.

Send for this bulletin now.
This new, free bulletin shows how Homelite Portable Pumps are saving time, money and trouble for thousands the world over. Write for your copy, now.

HOMELITE
CORPORATION
2208 Riverdale Ave., Port Chester, N. Y.

ing and drainage including a cut of approximately 106 feet deep and construction of seven bridges in West Providence and Snake Spring Townships, Bedford County. (Section 13D.)

To date the Commission has awarded contracts for grading and draining a total of 145.66 miles of the highway.

Idaho Chosen For National Bituminous Conference

In response to the invitation extended by the State of Idaho and the Idaho Highway Department the 1939 Montana National Bituminous Conference will be held at Sun Valley, Idaho September 11, 12, 13 and 14.

The executive committee for the Conference will be: D. A. McKinnon, State Highway Engineer, Montana Highway Department, General Chairman; D. L. Cheney, Bituminous Engineer, Montana Highway Department, Assistant General Chairman; H. R. Flint, Director of Highways, Idaho Department of Public Works, Vice Chairman.

The Conference program will be comprised of five sections. These sections and the chairman of each are as follows: (1) Research as Applied to Construction and Maintenance of Bituminous Surfaces—Professor W. S. Housel, Research Consultant for the Michigan Highway Department, chairman; (2) Fundamentals of Bituminous Construction—J. E. Buchanan, Dean of Engineering at the University of Idaho, chairman; (3) Design and Construction of Bituminous Surfaces—C. F. Seifried, Office Engineer of the Wyoming Highway Department, chairman; (4) Maintenance of Bituminous Surfaces—T. R. Perry, Bituminous Engineer of the Iowa Highway Commission, chairman; (5) Round Table Discussion—J. W. Powers, Engineer of Materials, Arizona Highway Department, chairman.

On each of the Conference sections a committee has been appointed to assist the chairman in assembling the material which will be presented to the Conference.

Papers will also be presented on two new features at this year's meeting. These are (1) The Importance of Design, Construction, and Maintenance of Bituminous Surfaces to National Highway Safety, and (2) The Bituminous Highway Surface of Tomorrow.

Well known and highly qualified engineers will present papers on each subject. The paper on The Importance of Design, Construction, and Maintenance of Bituminous Surfaces to National Highway Safety will be designed to fit in with the national campaign which is being carried on to increase highway safety and reduce highway accidents, and it is felt that such a paper will be of much interest as the design, construction and maintenance of bituminous surfaces is, of course, a highly consequential factor in general highway safety.

The paper on the Bituminous Highway Surface of Tomorrow will be devoted to a discussion of trends and changes which may develop in the field of bituminous surfacing and outlining and suggesting methods of long-range planning whereby our design and construction of today's surfaces may better fit in with the requirements of the future.

● **Adjusted to the slope of the ground, this Cleveland DR6 rock drill is operating in the Moanalua quarry of the Clark Transportation Co., Ltd., on the Island of Oahu, Hawaii.**

Sun Valley, Convention headquarters, is located in the Sawtooth Mountains in central Idaho and is served by the Union Pacific Railroad and U. S. Highway 93. The rate for the Conference will be $6.50 per day per person, American plan, all rooms with twin beds and bath.

Shasta Dam Aggregate Bids

Five bids were received recently by the United States Bureau of Reclamation for preparation of more than 10,000,000 tons of concrete aggregates for Shasta Dam. Three of the bids contemplate use of the North Kutras gravel deposit at Redding and two of the bids contemplate use of the Hatch deposit near Cottonwood.

The bids for the North Kutras tract were: Columbia Construction Company, Inc., of Oakland, $4,413,520; Redding Trading Corporation of Redding, $5,200,400; Hallett Construction Company of Crosby, Minnesota, and J. L. Shiely Company, Inc., of St. Paul, Minnesota, $5,674,080.

The bids for the alternative Hatch tract were: Redding Trading Corporation, $4,541,600; and W. E. Callahan Construction Company of Dallas, Texas, $5,587,600.

Walker R. Young, supervising engineer of the Central Valley Project, said among factors in addition to the

For your convenience in writing to Homelite Corporation, you will find a card bound in this issue.

Economical in Small Blasts too..

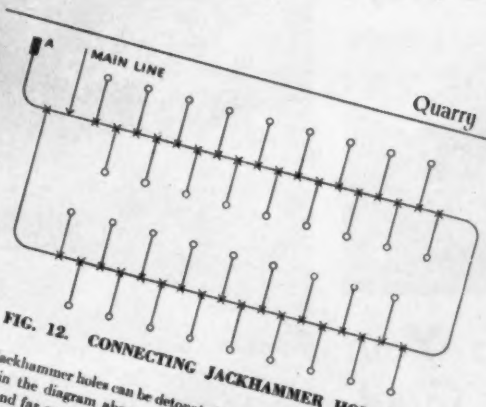


FIG. 12. CONNECTING JACKHAMMER HOLES

A series of jackhammer holes can be detonated economically by the use of Primacord, as illustrated in the diagram above. The branch line Primacord from each hole is allowed to extend far enough to make a wrap connection with a main line Primacord laid midway between the rows of holes. For instance, if the rows are 6 ft. apart the Primacord would extend out of each hole a distance of approximately 3½ ft. Regular connections with the main line are indicated at points X, and two or more rows of holes can be detonated simultaneously, by connecting their main lines with regular connections as shown. The entire blast is detonated by means of a fuse and cap or an electric blasting cap properly attached to the main line at point A.

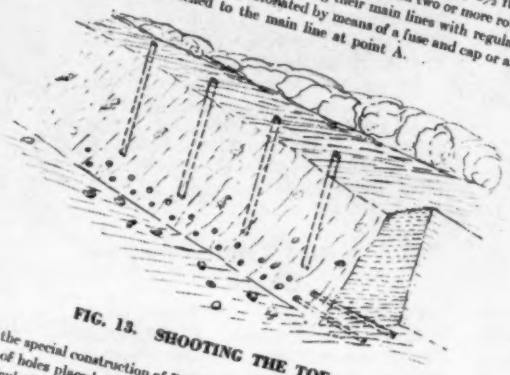


FIG. 13. SHOOTING THE TOE

Because of the special construction of Primacord-Bickford, it is possible to detonate a large number of holes placed at very close intervals without danger of cut-offs. This feature is particularly advantageous in shots where holes are used in shooting the toe in conjunction with well drill holes.

PAGE FOURTEEN

Primacord-Bickford is an instantaneous detonating fuse which must be detonated with a fuse and cap or electric blasting cap. It acts as the detonating agent in each hole, and also connects all holes. It can be employed profitably in small as well as in giant blasts, as shown in these diagrams.

Send for a copy of the Primacord-Bickford book—free to executives.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN., U. S. A. *Makers of Ensign-Bickford Safety Fuse since 1836*

PRIMACORD-BICKFORD *Detonating Fuse*

PB 11

For your convenience in writing to The Ensign-Bickford Co., you will find a card bound in this issue.

One of the Best Ways to Avoid Schedule Delays

is to Equip Your Bulldozers, Grading Blades and Scrapers With

GOODALL "Bulldozer" HOSE

Built for extremely high pressures, either oil or water, on all types of hydraulic equipment, GOODALL "Bulldozer" Hose insures positive, accurate control of pressure on your power take-offs. Special wire-braid construction provides unequalled strength plus necessary flexibility. The successful service record of this hose recommends it for your careful consideration.

Made in ½", ¾", 1", 1¼" and 1½" sizes. Prices and complete information promptly furnished. Contact our nearest branch.

GOODALL RUBBER CO.
5 S. 36th St., PHILADELPHIA, PA.
New York Chicago Pittsburgh
Boston Houston
FACTORY—TRENTON, N. J.

GOODALL RUBBER CO. of CALIF.
San Francisco Los Angeles Seattle
Salt Lake City Phoenix

● The source of Rohl-Connoly Company's drilling power on the Head Gate Rock Dam at Parker, Arizona is this skid-mounted, diesel powered, Sullivan compressor.

amounts of the bids which may influence an award of contract are the cost to the Government of acquiring gravel rights for the deposits, cost of obtaining rights-of-way for necessary railroad spurs, cost of transporting aggregates to the dam site, stipulations of the bidders, and general plans submitted by the bidders with respect to proposed processing, storage, and transportation facilities.

The aggregate requirements at Shasta Dam are for 7,600,000 tons of gravel, to be graded in four sizes, and 2,800,000 tons of sand. Unit prices in today's bids varied from 41.88 cents to 53 cents a ton for gravel, and from 36 to 53 cents a ton for sand.

PWA Issues First Turnpike Check

The PWA has given the Pennsylvania Turnpike Commission a $6,000,000 check, representing the first installment on the federal agency's grant of $26,100,000 for construction of the 160,-mile super-highway between Harrisburg and Pittsburgh.

Payments on the remainder of the grant will be made from time to time as work progresses on the highway and the Commission certifies that it has earned the additional installments to be requested.

The Commission sold $35,000,000 worth of bonds to the RFC to complete financing of the highway. To save interest payments, the Commission is drawing proceeds of the bond sale as funds are required instead of taking the entire $35,000,000 at one time. The bonds pay 3¾ per cent interest and are to be retired by tolls to be collected from users of the highway.

To date the Commission's operations have been financed by an initial allotment of $10,000,000 from RFC. Subsequent drafts on the bond proceeds will be followed by PWA contributions.

The PWA grant agreement specifically stipulates that the route must be "substantially completed" by May 1, 1940. To date contracts have been awarded for grading and draining practically the entire road, together for construction of the seven tunnels that will carry the highway through the Appalachian Mountains. Bids also have been received for paving approximately 17 miles with twin 24-foot concrete lanes.

Practically all the contractors are working on schedule, with a number running ahead of their stipulated time. A contractor working on one of the deepest cuts is about 40 days ahead of schedule and another 25 per cent ahead of his own program.

Call For Friant Dam Bids

Bids for the construction of Friant Dam, advertised by the United States Bureau of Reclamation, will be opened at 10 a.m., August 23, in Room 378 of the Federal Building in Sacramento, California, according to the announcement of Walker R. Young, supervising engineer of the Central Valley Project.

Friant Dam, to be located on the upper San Joaquin River 20 miles northerly from Fresno, will be 300 feet high and 3,430 feet, or about two-thirds of a mile, long. It will create a water conservation reservoir to be operated for supplemental irrigation and flood control in the San Joaquin Valley.

Friant will be a gravity-type concrete dam extending across the broad canyon on a straight axis with an overflow spillway in the center. Six outlet conduits for river regulation will pass through the dam. Other outlets on either side will discharge into the Friant-Kern and Madera canals which will take off at the dam to carry water to thirsty lands of five counties.

Friant Dam will back up the San Joaquin River about 15 miles to create a reservoir with a gross storage capacity of 520,000 acre-feet of which the

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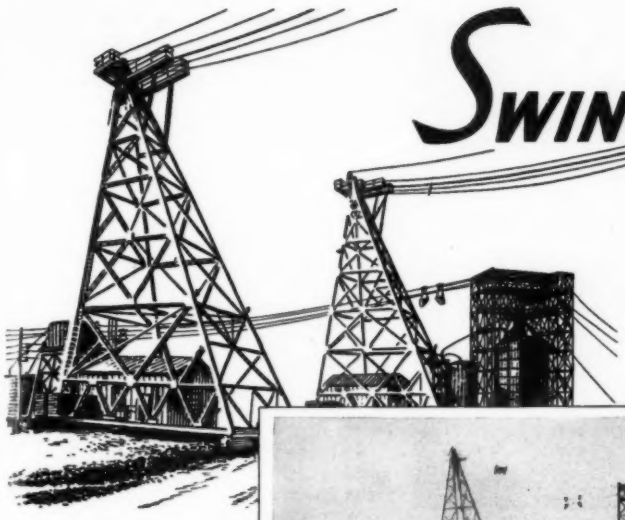


SWINGING 10½ TONS

Across a Third of a Mile Span

The two 350-ton cableway towers at Conchas Dam, N. M. Propelled along a 450-ft radial track by G-E gear-motors, each tower supports a 1650-ft span that carries a full bucket of 21,000 lb. The cableways were made by the Lidgerwood Manufacturing Co. for Bent Brothers, Inc., and Griffith Company, of Los Angeles, the general contractors

FOR swinging all types of materials across a 1650-ft span and keeping an important job moving, the electric equipment on the cableways at Conchas Dam must be extremely dependable. It must also be flexible enough to allow for accurate jogging in lining up heavy pieces or for fast travel in carrying away earth and pouring concrete.

Unless the two cableways keep moving, little work can go on around the dam. Completely powered by G-E equipment, they are used for material handling, conveying apparatus, carrying concrete, or placing steel.

For similar tough electric jobs on *your* construction projects you can count on G-E equipment for speedy, dependable performance. G-E engineers will be glad to help you get the electric equipment that will give you the most speed and dependability. General Electric Co., Schenectady, New York.

G-E a-c control panel, installed in one of the control rooms, assures accurate operation of the bucket over a wide range of operating requirements

Control room for one of the cableway towers. The operator, equipped with headphones, controls the bucket from signals. G-E motors drive the drums

GENERAL ELECTRIC

011-326H

For your convenience in writing to General Electric Co., you will find a card bound in this issue.

● A Bucyrus-Erie ½-yard shovel goes native as its operator uses a thatched roof to ward off excessive heat while opening a road to a drill site in the Barko Concession for the Columbian Petroleum Company at Cucuta, Columbia.

top 70,000 acre-feet is to be reserved for flood storage and the next 316,000 acre-feet will be active canal storage. The reservoir space below the outlets will be dead storage.

Present construction plans do not include a power plant at Friant Dam.

Mr. Young estimates the general contract will require about 770,000 cubic yards of excavation for the foundation and will involve the placement of about 1,850,000 cubic yards of concrete, which is enough to surface a standard three-lane highway connecting San Francisco and Los Angeles.

Friant Dam is to be the second largest dam of the vast Federal reclamation project which is designed to conserve and regulate the waters of the Sacramento and San Joaquin rivers in a coordinated program of navigation improvement, flood control, irrigation, salinity control and electric power generation for the Great Central Valley. A contract was awarded a year ago by the Bureau of Reclamation for the Shasta Dam and power plant on the Sacramento River above Redding where operations have reached a stage of large-scale construction.

R. B. Williams, veteran of 27 years with the Bureau of Reclamation including service at Boulder Dam and as construction engineer of the All-American Canal, has arrived in California from Washington, D. C., to become construction engineer of the Friant Division of the Central Valley Project. Mr. Williams will proceed to Friant after a conference with Mr. Young at the project headquarters in Sacramento.

Considerable work already has been done at Friant. In preliminary exploration about a mile of test holes has been driven at the dam site to prove the adequacy of the foundation rock. Surveys of the dam site and reservoir area are completed. Canal locations have been staked out from Friant a distance of 72 miles on the 160-mile Friant-Kern and 13 miles on the 40-mile Madera Canal.

A Government camp to house Bureau of Reclamation engineers, clerks, inspectors and surveyors has been built a half mile downstream from the dam site adjacent to the existing town of Friant in Fresno County. The camp includes 28 single family residences, 25 duplex cottages and two air-cooled

Here is a master filter . . . . . that brings used oil back to life

The Bucyrus Oil Reclaimer by simple warming, washing, and filtering processes removes all the impurities from your used crankcase oil, leaving a rich, efficient lubricant that gives even better performance than the original oil. Lubricating engineers have agreed for years that only the weaker and unstable molecules — about 10 per cent of the oil — are broken down by the heat and friction of engine wear. The other 90 per cent, made up of the strongest particles of the original oil, can be easily and safely separated for re-use by the successful Bucyrus Oil Reclaimer. And at an average cost of about nine cents per gallon!

Electrically operated and semi-automatic, the unit can be operated by any truck driver, yard attendant, or shop employee in less than a half-hour a day.

Write TODAY for the complete story of the Bucyrus Oil Reclaimer. Every one of our Reclaimer owners is more than satisfied.

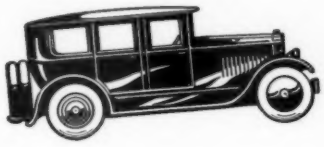
T-20

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

You can't afford to run a worn-out portable compressor



In 1924 you bought this car for $2,000.

•

Say you drove it 20,000 miles a year . . . that's high.

•

You probably averaged 30 miles an hour . . . most of the time floating along at light load . . . 20 to 25% load factor on the engine.

•

After five years it was costing too much to run, so you "turned it in." The speedometer showed 100,000 miles.

•

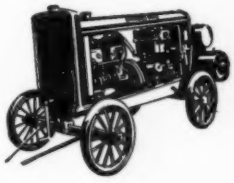
You couldn't afford to run a 5-year old car . . . too much for gas, oil, repairs . . . out of service too much because of troubles.

•

You bought a new car when economy dictated. You were lucky if you got $150 allowance for your old one.

•

Even your second car has probably reached the scrap pile by this time. No doubt you now drive a modern automobile.



In 1924 you bought this portable compressor for $2,000.

•

It has run 8 hours a day . . . 200 days a year . . . that's conservative.

•

It ran at an engine load equivalent to driving your old car upgrade about 60 miles an hour.

•

Today, 10 years after you "turned in" your old car, you may still be operating your 1924 portable. It has probably run an equivalent of 1,000,000 miles . . . 10 times your car mileage.

•

Your 15-year old portable now wastes gasoline and oil . . . up-keep is high . . . capacity is low . . . operation is unreliable . . . out of service too often.

•

You can't afford to operate this old portable on any important or sizable job . . . it isn't worth much to you or to anyone else.

•

It will pay you to replace it now . . . with a Modern I-R Two-Stage Air-Cooled unit.

Even if you have a 1932 I-R Portable Compressor—the last single-stage water-cooled model and the best of its day—you will save money by replacing it with a new I-R Two-Stage Air-Cooled unit.

It is more economical, more durable and more reliable than any previous unit on the market.

•

Send for the new 32-page bulletin, Form 3364, which gives all of the features and advantages of this modern Portable Compressor.

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dormitories—all with garages—and an administration building, testing laboratory, warehouse and combined fire station-garage. Friant Camp has paved streets and modern water, sewer, electricity and gas systems. The general contractor will build a separate camp for his employees.

The call for bids for Friant Dam followed recent acquisition of the dam site and nearby gravel deposits by the Government from the Madera Irrigation District.

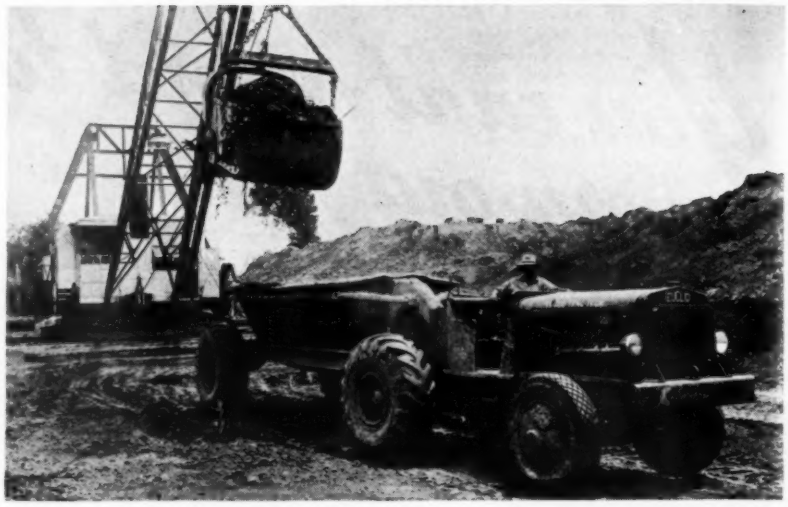
Enlarge Pishkun Reservoir

The Pishkun Reservoir on the Sun River project in Montana will be enlarged by raising the height of existing dikes and constructing new ones, Secretary of the Interior Harold L. Ickes announced recently in awarding a contract for the work.

The successful bid of $142,810 was submitted by T. G. Rowland of Salt Lake City, Utah, and was the lowest of nine proposals received and opened by the Bureau of Reclamation at its Fairfield, Montana, office on May 9, 1939.

In addition to constructing four new dikes, the contract includes raising the height of four existing dikes. These dikes will be made of clay, sand, gravel, and cobbles and will serve as higher embankments to wall in more water in the reservoir. Its capacity thus will be increased from a little over 22,000 acre-feet to about 29,000 acre-feet to furnish a more dependable supply of water for irrigating about 86,000 acres of land in the Greenfields Irrigation District on the North Side of Sun River.

The Pishkun Reservoir, located about 17 miles northwest of Augusta, Montana, is one of the three storage reservoirs on the Sun River project. Fed by the 12½-mile Pishkun Canal carrying water diverted at the Sun River Dam the Pishkun Reservoir acts as an equalizing reservoir for the main canal on the Greenfields Division.



● A Euclid Tractor-Truk pulling a 10-yard wagon is loaded by a Bucyrus-Monighan 5-W on a 1,500,000 yard dam construction job across Warrior River, Tuscaloosa, Alabama. Driver Company holds the contract.

The contractor is required to begin work within 30 calendar days after date of receipt of notice to proceed, and to complete all of the work within 225 calendar days.

New Jersey Highway Fund Diversion

A diversion of about 36 cents on the dollar is revealed by an analysis of the current annual highway appropriation bill for New Jersey. The bill passed by the New Jersey Legislature at Trenton and signed by Governor A. Harry Moore, authorizes expenditure of about $28,162,552 for all highway items out of total 1939 anticipated fund tax receipts of $45,246,000. Of this sum only $1,321,000 has been allowed for regular new state highway construction.

In addition to this $1,321,000, which will be matched with federal aid funds to make a total of $2,642,000 for regular state construction, there is an appropriation of $3,300,000 for purchase of materials to continue a WPA road program, to which the WPA is expected to contribute $20,000,000 for wages.

Diversion of $5,964,509.64 to meet a 1938 unemployment relief financing deficit reduced the amount of automotive taxes available for expenditure to $39,281,490.36. Besides this reduction, the bill leaves an unappropriated balance of $4,167,829.54 which would be diverted to current year relief under pending legislation, approved by the House but not yet acted upon in the Senate. After these deductions, the bill authorizes expenditures of $35,113,660.82.

The bill appropriates $9,645,700 for debt service, the majority of which is for purposes foreign to highways. This includes $7,194,450 for principal and interest requirements of the 1930 bond

More Yards per Dollar

2 cu. yd. Sauerman Slackline Cableway moves 120 tons of gravel per hour from river to top of plant.

Sauerman Scraper operated by crane digs a large saucer-shaped reservoir.

ON WORK where materials have to be moved distances beyond the reach of a boom or dipper-stick, a Sauerman machine cuts costs by being able to dig, haul and place the material in a continuous, straight-line operation, doing away with the expense of rehandling. One man controls the entire operation.

The complete line of Sauerman scraper and cableway machines includes sizes to meet all capacity requirements. There are light, portable units that can be moved from place to place to handle small yardage jobs and there are great powerful machines that take a 15 cu. yd. load of material at a single bite and haul this big load across the ground at a speed of 300 feet per minute.

Typical examples of pit and bank excavation, alluvial mining, moving blasted ore, deep dredging, stock-piling and reclaiming, etc., are illustrated in the Sauerman catalog. Write for your copy of this useful book.

SAUERMAN BROS., INC.
474 S. CLINTON ST., CHICAGO

SAUERMAN LONG RANGE MACHINES

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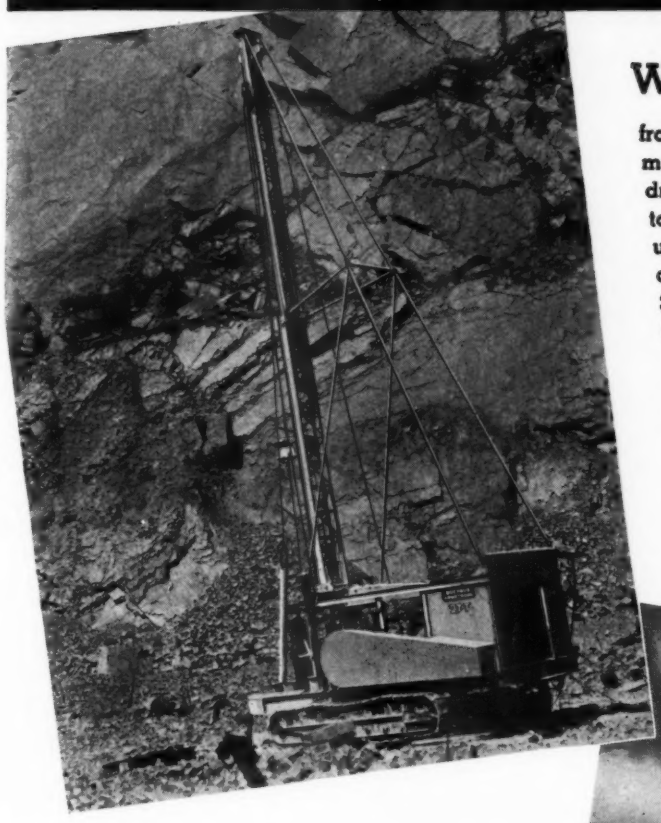
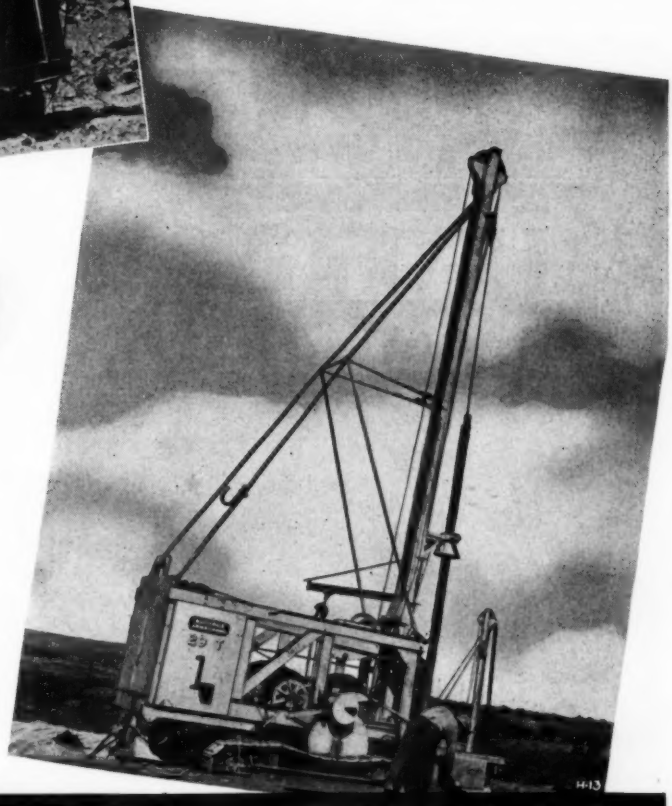
Save money on Your blast hole drilling with BUCYRUS - ERIE DRILLS



WHEN YOU REDUCE YOUR BLAST HOLE drilling costs to a minimum, the profits from your quarry or open pit mine automatically increase. Bucyrus-Erie blast hole drills — the 27-T, 29-T, and 42-T — are built to do this for you. By modernizing, with up-to-date, efficient Bucyrus-Erie drills, you can cut your blast hole drilling costs from 30 to 50 per cent — a saving that turns out to be a MONEY-MAKER.

The 27-T swings 2,000 pounds of tools and drills 6 to 8-inch holes — the 29-T swings 3,000 pounds of tools and drills 9 to 12-inch holes — and the 42-T swings 6,000 pounds of tools and drills 9 to 12-inch holes. These are the fastest drills on the market.

Put Bucyrus-Eries on your job and watch your rock or ore preparation costs drop.



BUCYRUS ERIE

Frequent setups and tool changes take a considerable portion of the blast hole driller's time. But with the new built-in tool wrenches, now available on all Bucyrus-Erie blast hole drills, tool changes are made quickly, easily . . . and safely. Save money by changing costly preparation time into productive drilling time.

Write TODAY for illustrated bulletins on the Bucyrus-Erie line of cost-cutting blast hole drills.

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

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act, divided as follows: $3,476,562.50 for emergency relief; $1,142,500 for educational aid; $527,600 for construction of state institutions, and $2,047,787.50 highway improvements. The balance of the debt service is $2,451,250 for interest on road, bridge and viaduct bonds.

Total mandatory dedications and appropriations to other departments are divided as follows: Motor vehicle department, $1,623,585; state tax department (motor fuels tax division) $217,615; board of commerce and navigation, $135,000; Delaware River Joint Toll Bridge Commission, $81,220.82; state police, $582,710, and state employes' retirement system, $130,830.

State aid to counties and municipalities for debt service and construction, reconstruction and maintenance of local roads and bridges totals $9,570,000.

An appropriation of $7,185,000 is provided for general operations of the highway department, including: Maintenance, $3,200,000; state, county and municipal highway lighting, traffic signals and operation of bridges, $1,335,000; institutional roads and approaches, $400,000; plant and equipment purchases, $200,000; and administration, engineering, inspection and administration costs of rights-of-way, $2,050,000.

Revenues for the current calendar year as anticipated by the bill follow: $23,000,000, tax on motor fuels, $19,500,000, motor vehicle fees, fines, etc.; $940,000, motor vehicle inspection fees; $85,000, bus excise tax; $1,321,000, federal aid; miscellaneous revenues, $400,000.

● Beginning a highway for Hawkins County, Tennessee. The county owned Bucyrus-Erie ⅜-yard shovel excavates along the Holston River, near Rogersville. Clyde B. Davis, Commissioner of Roads is supervising the work, with Harry Poe as foreman in charge.

Retail Gasoline Prices Still At 13-Cent Level

Retail gasoline prices averaged 13.22 cents per gallon on June 1, 1939, as compared with 14.22 cents on July 1, 1938 and 13.16 cents on May 1, 1939, according to reports from 50 representative cities reaching the American Petroleum Institute.

The cost to the consumer, however, was increased by taxation to 18.66 cents per gallon on July 1, 1939, as against 19.66 cents a year ago and 18.66 cents a month ago.

The retail price in 50 cities has averaged less than 14 cents per gallon every month of 1939 to date, Institute records show, although state and federal gasoline taxes, equivalent to a retail sales tax of about 40 per cent, have lifted the retail cost above 18 cents per gallon.

Dredge Missouri Sets Pumping Record

A new distance record for pumping hydraulic fill at Fort Peck has been set with the Dredge Missouri pumping through a pipeline approximately six miles long. The greatest length of 28-inch pipeline to be used as a continuous dredge line was in service last June, at which time material was pumped six and one-half miles from the Dredge Missouri borrow pit to the berm on the upstream side of the dam. The highest point of the line was 232 feet above the surface elevation of the river at the dredge. Nine 2500-horsepower electric, motor-driven pumps located at various points along the line were used to move the mixture of fill material and water at a velocity of about 14 miles an hour, and solid material pumped at this rate averaged more than 2000 cubic yards per hour for a 24-hour period.

Later the Dredge Missouri transferred operations from the upstream berm to the east end of the main dam where Pump Boat 3702 had been dismantled and glory hole spillways had

The ⅝ yard Hi-Power is a bucket the truck crane man swears by — for speed, digging power and yardage. Let us quote you prices on any size from ⅝ yard up.

In stock at New York, Philadelphia, Baltimore, Atlanta, Hartford and Los Angeles.
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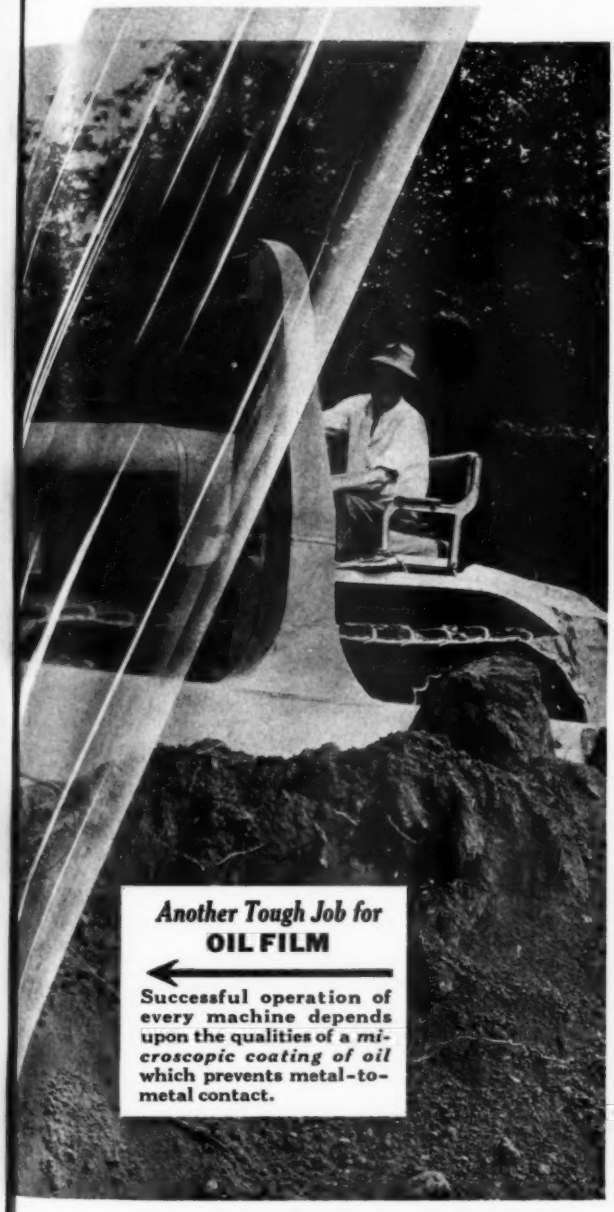
HIGH-SPEED" DIESEL TRACTORS

on the Job


Another Tough Job for
OIL FILM
Successful operation of every machine depends upon the qualities of a microscopic coating of oil which prevents metal-to-metal contact.

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Industrial Service and Lubricants Help to Lower Costs by

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been installed to drain the hydraulic fill area by gravity flow. Hydraulic fill operations in this area are in progress on the upstream side of the rolled fill core only at this time.

Port liner castings for the upper gate in Main Control Shaft No. 3 were concreted in position thus completing major steel operations in this shaft. However, considerable concrete must be poured to complete the inner tower above the port castings.

Great Plains Water Program Completed

Plans for administration of the Great Plains water conservation program have been completed according to government news sources which state that President Roosevelt has issued an order outlining the procedure.

The Great Plains program, recommended by the Northern Great Plains Committee of the National Resources Committee, contemplates the development of water supplies and construction of irrigation projects in the area most critically affected in recent years by prolonged drought.

The Congress included in the Interior Department Appropriation Act for 1940 an item of $5,000,000 to assist in financing the necessary construction. This money was appropriated subject to allocation by the President to carry out the program with the assistance of moneys to be contributed from work relief funds. Projects constructed would be subject to repayment by water users of so much of the costs as they equitably could bear. Non-reimbursable amounts would be considered as relief expenditures in the affected area.

Under the President's order:

1. Allocations from the $5,000,000 appropriation will be made for projects individually.
2. Recommendations for allocations will be prepared by the Department of the Interior in accordance with the general policies set forth in the report of the Northern Great Plains Committee, dated October 14, 1938, and will include the concurrence or views of the Department of Agriculture and the Works Progress Administration.
3. Each recommendation will include a description of the proposed project, an estimate of the total cost of the completed project, estimates of the work which can be performed by relief labor and of the reimbursable cost, and a statement of the proposed participation of each Federal Agency concerned together with the recommended amounts of funds to be allocated to each.
4. The Secretary of the Interior acting through the Bureau of Reclamation will be responsible for the construction of projects, except as may be otherwise recommended.
5. Recommendations will be transmitted to the President through the Bureau of the Budget.
6. The National Resources Committee through its Northern Great Plains Committee will continue to coordinate these and related activities.

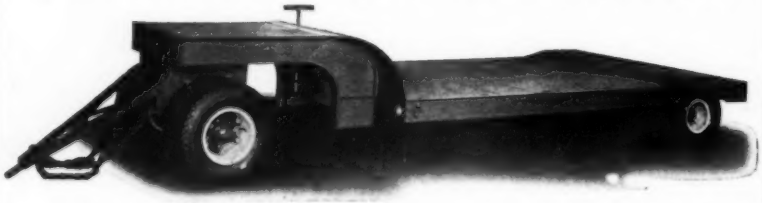
The amounts to be repaid will be determined in accordance with the estimates of the ability of the water users to pay, and the repayment contracts will be negotiated and administered by the Farm Security Administration of the Department of Agriculture.

The Bureau of Reclamation, which will be the principal construction agency, in the progress of its regular work, has investigated many projects in the Great Plains, gathering data upon which recommendations may be based. The plan contemplates use of relief labor to the fullest extent possible. Engineering direction and services will be drawn principally from the staff of the Bureau of Reclamation.

(*Continued on page 483*)

● An RD 8 Tractor and No. 48 Elevating Grader owned by M. L. O'Neil & Sons of Eugene, Oregon, are shown here building subgrade for a new state highway between Ritzville and Neppell, Washington.

A COMPLETE LINE OF TRAILERS



For All Heavy Duty Hauling Jobs!

JAHN "Super-Built" trailers are built in a complete range of sizes —a trailer for every heavy hauling requirement, with specialized trailer engineering behind every one. Jahn builds **only** heavy duty trailers. That's why Jahn trailers give many more years of service . . . why Jahn trailer goosenecks don't sag out of shape . . . why Jahn axles stand up under tough conditions.

JAHN trailer designs include complete combinations of wheel arrangements for every type of load, conforming to practically all state regulations. Advanced engineering features offered in the JAHN trailer line include: extra-strength gooseneck, front dolly and axle construction, deep wide flange main beams; ample cross members and gusset plates; internal expanding brakes, and the latest development in positive brake equalization.

The 6-wheel, 20-ton model shown above, as well as all other gooseneck type full trailers, can be converted into semi-trailers without any mechanical changes, by simply removing the front dolly assembly. King pin furnished fits any standard semi-automatic fifth wheel.

It will pay you to look at JAHN trailers before you buy **any** trailer. Write for details.

C. R. JAHN CO. 1349 W. 37th Place, Chicago, Ill.

"COME TO TRAILER HEADQUARTERS"

For your convenience in writing to C. R. Jahn Co., you will find a card bound in this issue.

INCREASE your PAY LOAD 20-25%

Modern steels, modern welding and modern Bucyrus-Erie design are behind this quarry and mining dipper, carrying 20 to 25% bigger pay loads on the Iron Range. Here are six reasons:

1 — Carries a FULL load . . . because of short back, long lip and high teeth that throw ore, rock or dirt well back.

2 — Fills fast . . . because sharp teeth and protruding lip slide up through the bank with minimum friction.

3 — Dumps fast . . . because of smooth, flared inside and wide-opening door.

4 — Cuts an accurate floor . . . because of square cutting face on teeth.

5 — Forged alloy steel teeth are easily reversed, resharpened or replaced. No other teeth on the market compare with these for performance.

6 — Oversize is easily handled because of the unobstructed top.

Write today for full details on this Range-proven quarry and mining dipper.

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

D27

Mining Gold

(Continued from page 437)

seem to interfere at all with its operations as a shovel. They add to its stability which aids considerably in getting through some of the tougher portions of the digging. The stripping contract calls for a minimum excavation of 12,000 cubic yards a month, but the crew has set 20,000 yards as its goal. Wet weather and hard digging have made it impossible to reach this figure—the best 30-day period thus far being 18,459 cubic yards, but with a run of fair weather and good luck with the digging, the goal can be reached.

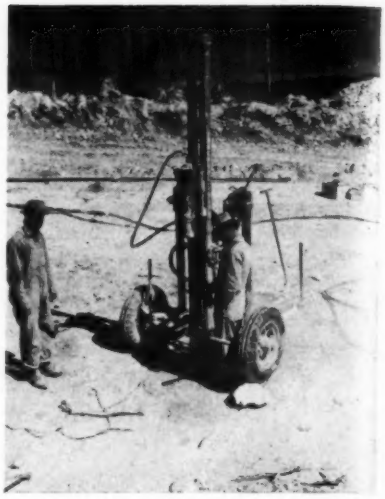
200 Tons of Ore Per Day

At the same time the stripping is going on, ore is being taken from the pit at the rate of 200 tons per day (one shift). The ⅝-yard General shovel, which started the stripping has been purchased by the Mine, and is used to load ore into 2-yard Ford dump trucks for the haul to the mill, 0.7 mile away. The mill must have ore every day, rain or shine, and for this reason a road has been cut into the pit from the bottom of Red Hill, so that the trucks have a down-hill all-weather road out of the pit. This road will be used to haul stripping as soon as the present ramp to the dump becomes too steep.

In addition to loading ore, the General cleans off the overburden in contact with the ore, and does other work not suitable to contract. Its daily output is held down by the nature of its work, but it usually handles 50 to 60 yards an hour. The ore is generally harder than the saprolite and requires heavier shooting. It is drilled with jackhammers and shot with 40% dynamite. The General is not as fast as the 22-B but in our experience at the mine it is rugged, powerful and heavy for a ⅝-yard machine. For the type of work it is doing, these features are more important than speed.

Operations at Old Beguelin Pit

The Red Hill stripping and mining are the largest excavating operations in progress at the Haile but some stripping is continually being done at the old Beguelin pit. This pit is 100 feet deep and still contains considerable ore at lower levels and at one end. The cost of additional stripping is comparatively higher because of the depth of the ore and the fact that the old dragline dumps at the end of the pit must be recast. At present, an exploratory drift is being driven in the end of the pit, to determine the amount of ore present, and as soon as this fact is established, it will



● An Ingersoll-Rand wagon drill at work on Red Hill. This unit drilled 800 to 900 feet of 12-foot holes per day.

● Bucyrus-Erie 22-B shovel at work on Red Hill. A tractor pulls a road grader over the pit road in foreground.

● The stripping crew on Red Hill. Left to right: Charlie Whitehouse, truck foreman; Richard S. Merritt of Lawrence Contracting Company (co-author of this article); Sam Newell, Superintendent; Cole Roach, 22-B oiler; Harvey Burns, truck driver; W. M. Reagan of W. M. Reagan & Sons, Inc.; Boland Price, 22-B operator; Dan McGrew, truck driver (behind others).

be possible to decide whether underground mining will be more economical than open pit mining with heavier stripping.

While this question is being answered, the Mine has its ¾-yard Austin dragline with 40-foot boom pulling back the overburden from the 50-foot face of the ore at the end of the pit. The crest of the existing dragline dumps are 50-feet above the rim of the ore, consequently, the dragline must handle the overburden several times to get it on top or behind the old dumps. With a 180 degree swing, the Austin moves about 50 yards per hour.

Operate 24 Hours a Day

Ore is mined by hand, 24 hours a day, six days a week, in the Beguelin pit and hoisted to the surface on an inclined skipway, which empties into the coarse ore bin. Ore from Red Hill is hauled by truck to the crushing plant. Trucks dump on a grizzly and the ore drops into a hopper. It is then fed by an apron feeder to the 24-inch belt conveyor, which transports it to the top of the same coarse ore bin. Conveyor belts carry the ore to a jaw crusher and then to the ore treatment plant.

The ore treatment plant is based on the all-sliming, continuous counter-current decantation method of cyanidation. The plant consists of two parallel and nearly identical units. The first unit went into production July 1st, 1937.

This was designed for a daily capacity of 125 tons. However, it was found that under certain conditions it handled as high as 175 tons per day. The second unit was designed to handle 175 tons of ore per day. This unit went into

● Hoisting, storage, crushing, conveying and cyanide plants at the Haile mine. Note dragline stripping overburden from Beguelin pit at right.

production in late November, 1938.

At the present time, the two units are handling about 350 tons of ore a day, which averages about $5.00 per ton. The ore is ground to about 75-90 per cent through 200 mesh. Extraction varies from 88 to 92 per cent, depending upon variations in the ore.

Over $500,000 in Gold Since 1937

About every two weeks a "cleanup" is made and a bar of bullion is shipped to the Philadelphia Mint. Since operations began in 1937 over $500,000.00 of bullion has been so shipped. The present rate of gold production at the Haile Mine makes it the largest gold producer east of the Mississippi river. It is expected that in 1939 it will be well up among the twenty largest gold producing mines in the United States.

Mining operations at the Haile are under the direction of Edmund Newton, mine manager; D. B. Gregg, superintendent of mining and milling operations; William N. Chandler, engineer in charge of exploration; Raleigh Younger, foreman, Red Hill Pit; R. O. Whitaker, foreman, Beguelin Pitt; W. A. Russ, general operator; E. C. Blackmon, Austin operator.

The Lawrence Contracting Company has Richard S. Merritt in charge of stripping operations; S. R. Newell as superintendent, and Boland Price as operator on the 22-B. The Foreman for W. M. Reagan and Sons, Inc., is Charlie Whitehouse.

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BUCYRUS-ERIE

Small Shovels . . .

(Continued from page 447)

line construction, up to depths that can no longer be reached by that type. On crossing jobs, it was necessary to use a dragline on account of the nature of the soil and greater depth of excavation. The 10-B has proved a very satisfactory and mobile type of equipment for this work."

The 10-B, rigged as a dragline, is shown in another illustration, working with a ⅜-yard bucket. The location in this case was in a slough bottom impregnated with water. The excavation here is 19½ feet deep, in which piles later will be driven, capped with concrete. The total excavation per hole at this point was 140 cubic yards. Pumping of the excavations was necessary as the water ran in constantly.

Highway User Taxation

(Continued from page 448)

40 per cent of all state tax revenues.

Highway users also pay other special taxes peculiar only to their group—ton-mile taxes, weight or capacity taxes, operators' licenses, special title taxes and many others. It is probable that nearly half of all state tax revenue is derived from special highway user taxation.

The fact cannot be over-emphasized that these special taxes paid by the highway user are in addition to the taxes he pays as an average citizen. He, therefore, pays sales taxes, income taxes, property taxes, business taxes, pay roll taxes, and all other taxes paid by the non-car-owning individual.

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Chuquicamata Copper

(Continued from page 441)

brackets which are welded to the cat side frames. Located at the driving end of the shovel mounting, the unit extends a little beyond the end of the cat belts.

The car puller cable leads from the bottom of the drum to a large diameter sheave mounted underneath and at the opposite end of the truck frame. From the sheave the cable leads back through a fairlead mounted in the car puller frame at the opposite side of the drum. From here the cable leads from the fairlead directly to the train of ore cars.

Since the unit had to be mounted low enough to clear the rear end of the revolving frame, some sacrifice in ground clearance was necessary. To guard against damage to the sheave and cable that are below the frame, a special fender or clearance plow is mounted at the forward end of the truck frame on the take-up axle. This plow pushes aside rocks and other material large enough to damage the parts.

The car puller attachment practically makes the electric shovel an independent loading unit as the services of the locomotive are only required to bring the empty cars and haul away the loaded ones. The car puller spots the cars in an efficient manner without loss of time.

Sequence of Car Puller Operation

The accompanying diagrams show the sequence of the loading operations at the Chuquicamata mine. Ten to fifteen-car trains weighing from 1,000 to 1,500 tons (loaded) are generally used in the operations. For this illustration we have used a 14-car train. The pit locomotive pulls the empty train to the digging location and spots car 4 (Figure A) at the shovel and leaves for other duties. While the pitmen attach the car puller rope to car 9, the shovel immediately starts loading car 4. This hitch serves for moving three cars before the rope reaches the position where it is no longer effective (shown by dotted lines). Then, while the shovel is loading a recently spotted car, the rope is detached and hitched to a car farther back in the train, etc., until car No. 14 is reached (Figure B).

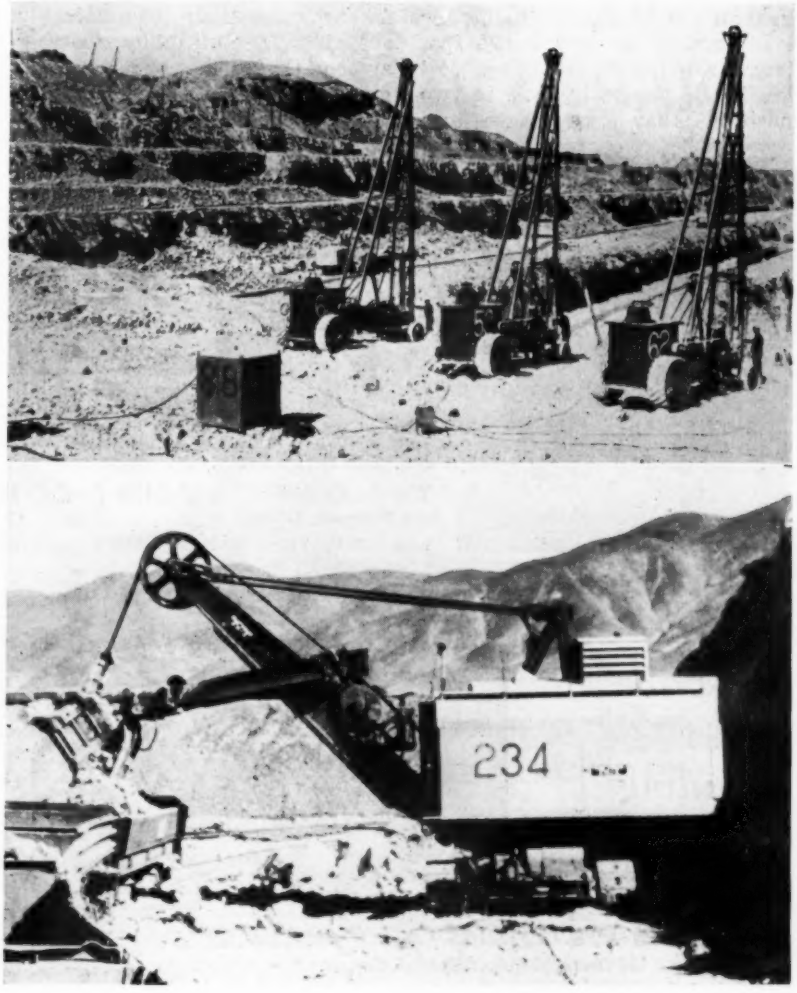
At this point, after the shovel has loaded car No. 12, (Figure B) the locomotive returns to spot cars 13 and 14. After this the loaded cars are hauled away, leaving car 3 (Figure C) spotted at the shovel to be loaded while a train of empties is switched onto the loading tracks. The operating crew has developed a handy method of extending the rope back to position "X" (Figure C). The drum is declutched and the cable is hooked to the loaded, outgoing train with a wooden pin instead of the regularly used steel pin. Upon reaching the end of the car puller cable the wooden pin breaks and the cable falls to the ground in position for coupling to the next train.

Upon arrival of the train of empties, they are hooked onto car 3, the car puller rope is attached (Figure D) and the operation is repeated as in Figure A.

Shovel Busy Between Train Changes

It is interesting to note that in this example the first three cars are used as "reserve" loading capacity during the changing of three trains so that the shovel will not remain idle. The number of "reserve" cars varies from one to six to suit traffic conditions, each car serving for one change of trains.

With variations in the number of cars, this routine also serves for



● Top: Three of the company's 93 Cyclone electric churn drills at work in the foreground. Bottom: One of the Bucyrus-Erie 4-yard electric shovels loading an ore train. Note the car puller unit on the shovel.

loading waste cars on "dead end" tracks. On benches where a "through" track is available the procedure is much simpler, for then the shovel starts loading car 1 and loads right through to the third last car. The incoming locomotive, drawing a train of empties, spots the last two cars (13 and 14, Figure A), moves forward to spot car 1 of the train of empties it is pulling, unhitches the empties and pushes away the loaded cars (13 and 14).

The electric shovel and car puller combination is manned by a crew of one shovel operator and two pitmen on each shift. One of the pitmen acts as the car puller operator, receiving his signals from the shovel operator. The other pitman does general work including the hitching of the car puller cable to the cars.

The cycle of operation of the shovel-car puller combination is continuous and the shovel always has an empty car available for loading. The ore cars are 31 feet long, coupling to coupling, and loading is generally done in two positions, that is, two moves to a car. As the forward part of the car is filled the next move is to the rear of the same car and then to the front of the following car, etc.

The shovel operator signals when he is ready for a move, and the car puller operator begins to move the cars immediately after the dipper has been unloaded. Each of these 15 foot moves is made by the car puller in about 30 seconds. The operator uses the time of the car moving cycle to swing 170° to 180° to point of digging which is also about a 30-second cycle, and by the time the shovel returns to dumping position the car has been moved. Officials of the mine report an average output of 3,400 tons per 8-hour shift with the shovel-car puller combination.

Level Grade Necessary

As mentioned before the benches of the mine at Chuquicamata are long and quite level. This factor makes the mine admirably suited to the car puller spotting system. On benches of any sizable grade it would not be safe to use the car puller unless self-adjusting brakes were adapted to the ore-train to prevent the locomotive-less train from running away in the direction of the car puller rope haul.

Loaded ore cars are made up into trains and hauled on an average of 2.3 miles to the crusher. Here the ore is crushed to 90% through a ⅜" mesh then leached in a sulphuric acid solution which is itself derived from the ore. The solution is dechloridized and the copper deposited electrolytically is melted and cast as electrolytic copper shapes for shipment which is made principally to European countries.

In charge of operations at the world's largest copper mine is the following personnel: Burr Wheeler, General Manager; T. A. Campbell, Ass't. General Manager; Mat Sample, Mine Superintendent; D. M. Dunbar, Ass't. Mine Superintendent; R. L. Witcomb, Breaking Ground Foreman; G. S. Wyman, Shovel Operations and Transportation Foreman; R. G. Walker, Mine Mechanical Foreman; and A. G. Bard, Mine Electrical Foreman.

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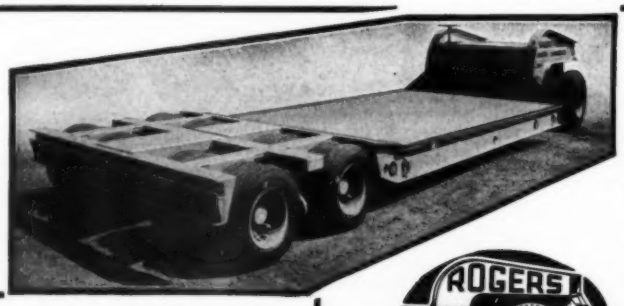

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Shots from the Firing Line

(*Continued from page 476*)

Active construction, of course, cannot be started until funds are allocated for the individual projects.

Southern Flood Control Program

Lt. Col. William F. Tompkins, U. S. District Engineer in charge of the Second New Orleans Engineer District, has announced his tentative construction program for the fiscal year beginning July 1, last.

The program calls for the placement of some 18,000,000 cubic yards of earthwork along the Mississippi River front and in the Atchafalaya Basin. In addition to this, the District has been allotted $100,000 of general flood control funds for work on the Homochitto River, consisting principally of excavation of cutoffs and channel improvements.

OBITUARIES

Frank P. Carrigan

Frank P. Carrigan, 79, pioneer in the marble industry, died June 24 in the Presbyterian Hospital, Newark, New Jersey, following a year's illness. He resided in Maplewood, New Jersey.

Born in Pittsford, Vermont, Mr. Carrigan entered marble quarry work when a youth. He selected and shipped marble which was used in construction of several states' capitols and federal buildings in Washington. After a 40-year career in marble, Mr. Carrigan retired as superintendent of the Vermont Marble Company in 1917.

Surviving are his three sons, Charles O'Malley Carrigan of New York, Dr. Frank P. Carrigan and John T. Carrigan, both of Maplewood, three daughters, three sisters and a grandson.

Guy Pinner

Guy Pinner, 51, chief engineer of the American Cyanamid Company of New York City since 1931, died June 25 in Lawrence Hospital, Bronxville, New York, of pneumonia after a short illness. He resided at the Chatsworth Gardens Apartments, Larchmont, New York.

Born in Elizabeth City, North Carolina, Mr. Pinner received a civil engineering degree from North Carolina State College in 1907. He began his engineering career as a draftsman in the designing department of the Phoenix Bridge Company, Phoenixville, Pennsylvania, and later was a consulting engineer in Bronxville for the American Bridge Company. Following which he was associated with Herbert C. Keith, Bronxville consulting engineer; was in charge of the American Indemnity Company's efficiency and engineering department at Galveston, Texas, and was engineer in charge of maintenance and construction of the Seaboard Airline Company.

In 1918 Mr. Pinner became associated with the contracting firm of James Stewart & Company, as engineer in charge of the naval operating base at Norfolk, Virginia. Then he spent three years in Colombia, South America, on engineering projects in connection with large oil developments. He served later as chief engineer and then manager of the Andean National Corporation in South America. Returning to New York in 1925, he became vice president in charge of Latin American work of the Foundation Company, contractors. In 1929 he joined American Cyanamid.

Survivors are his wife, Mrs. Barbara Pinner; two sisters, Mrs. E. P. Alexander of Elizabeth City and Mrs. A. T. Tillit of New York, and three brothers, Warren Pinner of New York and John and Joseph Pinner of Elizabeth City.

Mr. Pinner was a member of the American Society of Civil Engineers, the American Railway Engineers Association, the Engineers' Club and the Westchester Country Club.

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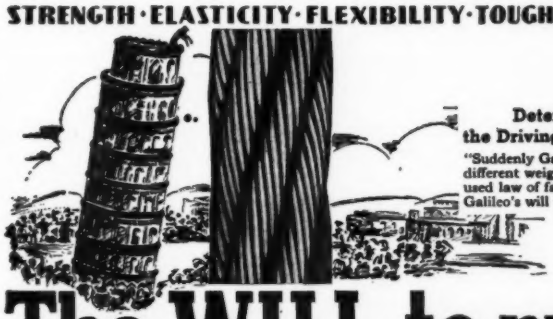

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BUCYRUS ERIE

Trade notes

The Associated Equipment Distributors held their semi-annual meeting in Chicago on June 20, 21 and 22. Outstanding were papers presented by A. F. Sersanous, President of the Board of Governors, W. G. Morgan, the Association's second Vice President, and Mr. Marshall of the A. G. C. Mr. Marshall presented a paper written by W. A. Klinger, a past President of the Associated General Contractors of America, entitled "Re-employment in Construction." This paper, supplemented by chart illustrations, showed the importance of construction to the economic system of the nation.

The opening of a branch office at 1544 Broadway, Denver, Colorado, was recently announced by the Independent Pneumatic Tool Company of Chicago. The new branch, in charge of C. A. Turnquist, is staffed to render complete sales and service assistance on the company's lines of Thor-Cochise mining and contractors' equipment and Thor portable electric and pneumatic tools.

The Ransome Concrete Machinery Company, Dunellen, New Jersey have just announced the appointment of Columbia Equipment Company, 81 S. E. Yamhill Street, Portland, Oregon, with branches at 87 Holgate Street, Seattle, Washington; N. 1405 Ash Street, Spokane, Washington; and Boise, Idaho to handle their complete line of construction equipment in the States of Oregon, Washington, and part of Idaho.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

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SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

BUCYRUS-ERIE GA-2 GAS-AIR HIGH LIFT SHOVEL. Good operating condition. Located Eastern Pennsylvania. Box 2289

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. Good mechanical condition. Located vicinity Boston. Box 2287

BUCYRUS-ERIE 34-B Combination Diesel shovel-dragline, 1½-yd. Used ten months. Overhauled since. Good as new. Located Kansas City, Mo. Box 2317

P&H MODEL 400 GASOLINE SHOVEL. Waukesha engine rebuilt late 1938. Machine generally good condition. Located Arkansas. Box 2285

BAY CITY GAS TRACTOR TYPE SHOVEL AND DRAGLINE—¾-swing. Fair condition. Located Pittsburgh. Box 2286

P&H MODEL 300-B GAS SHOVEL AND DRAGLINE. Used very little. Excellent condition. Located Southern Michigan. Box 2291

SPEEDER MODEL D-4 ⅝-YD. Dragline bucket and 35' boom. Waukesha engine. Electric starter. Will rent. Good condition. Located Iowa. Box 2292

BUCYRUS-ERIE TYPE B HIGH LIFT STEAM SHOVEL. Good operating condition. Located Missouri. Box 2294

BUCYRUS-MONIGHAN 2-T Diesel Dragline. 70' boom. Located Kansas. Box 2337

LORAIN-40 Gas Shovel. Electric starter. Waukesha engine. Located North Carolina. Box 2267

BUCYRUS-ERIE 43-B Gas shovel. 23' boom, 17' dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6"x7" Model E engine. Extensively repaired. Excellent shape. Located vicinity Boston. Box 2257

MEAD-MORRISON gas ⅝ yd. shovel. Buda 4 cylinder model YTU engine. Operating condition. Located central Wisconsin. Box 2303

BUCYRUS-ERIE 21-B Gas ⅝ yd. rope crowd shovel and 40' boom dragline including Type Y drag bucket. Wisconsin B-3 engine. Very good condition. Located Illinois. Box 2311

BUCYRUS-ERIE B-2 1 yd. steam shovel. Operating condition. Located vicinity Detroit. Box 2308

NORTHWEST MODEL 105 gasoline 45' boom crane. Twin City 6¼"x8" 4 cylinder engine. Very good condition. Located vicinity Duluth. Box 2298

BUCYRUS-ERIE 32-B gasoline shovel. 21'6" boom—16' dipper handle—⅞ yd. dipper. Chain Crowd. 40' boom clamshell equipment. Wisconsin D-3 6 cylinder 5"x6" engine. Electric starter. Extensively repaired. Excellent condition. Located Eastern Pennsylvania. Box 2307

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6¼"x8" 4 cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2313

BUCYRUS-HRIE E-2 Diesel 65' boom clamshell including 1½ yd. clamshell bucket and Kohler light plant. Atlas engine. Located Kansas. Box 2309

P&H MODEL 700 gasoline 50' boom clamshell and dragline. Waukesha 4 cylinder 6¼"x8" engine. Good operating condition. Located Iowa. Box 2306

MARION MODEL 381 2 yd. shovel powered by Hesselman engine. Good operating condition. Located near Pittsburgh, Pa. Box 2304

UNIVERSAL GAS TRUCK CRANE. Full revolving. 20' boom. ⅝-yard Kiesler clamshell bucket with teeth. 4-wheel Mack truck. New tires last January. 4-cylinder 4¾"x6½" engine. Complete overhaul within last year. Ready to go to work. Located Chicago. Box 2324

BUCYRUS-ERIE 32-B—Gasoline chain crowd 1-yard shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed Otherwise excellent condition. Located near Boston. Box 2325

BAY CITY—⅝-YARD GAS CLAMSHELL. Also drag shovel equipment. Located near Boston. Box 2330

P&H MODEL 400—Combination ¾-yd. gasoline shovel and crane. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2334

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered Located South Dakota. Box 2329

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2333

BUCYRUS-ERIE GA-3—Gas-Air 1¼-yard high lift shovel and 45' boom clamshell machine. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Worked less than half the time since complete overhaul a year ago. Located New Jersey. Box 2326

BUCYRUS-ERIE D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom. 1¼ yd. Page Bucket. Field reconditioned. Excellent mechanical and operating condition. Box 2328

KOEHRING MODEL 501 gasoline 1¼ yd. shovel. Wisconsin 6 cylinder 6"x7" engine. Electric starter. Extensively repaired. Good operating condition. Located Texas. Box 2302

LORAIN UNIVERSAL MODEL 35—Dragline—28' boom. Waukesha 4½"x6" engine. Recently overhauled. Fine condition. Located California. Box 2290

BUCYRUS-ERIE 37-B Diesel dragline. New D-13,000 Caterpillar Diesel engine. Balance machine reconditioned. First class operating condition. New shovel equipment available at reduced price. Located Milwaukee. Box 2288

BUCYRUS-ERIE 43-B combination Diesel — shovel and clamshell—equipped with 22' boom, 17' dipper handle, 1¾-yd. dipper, 70' clamshell boom equipment, complete with tagline equipment, laggings, but no fairleads; powered with a Buda 6-cylinder Diesel engine, electric starter. No clamshell bucket. Box 2327

MEAD-MORRISON. ⅝ yd. Gas shovel. Very good operating condition. Located vicinity Boston. Box 2338

BUCYRUS-ERIE 55-B Diesel—80' boom dragline. Atlas 6 cylinder 8½x9½" engine. Good operating condition. Located Eastern Pennsylvania. Box 2342

KOEHRING MODEL 601 Diesel—50' boom Dragline. Powered by Buda 4 cylinder 6½"x8¾" Diesel engine. Engine completely overhauled late last year. Located Central Illinois. Box 2343

NORTHWEST No. 8 dragline, 50' boom. Twin City oil engine. Raised portable gantry. Revolving type fairlead. 1500 watt Model E Kohler light plant. Fully enclosed house. Late model. Excellent condition. Located Pacific coast. Box 2344

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 2345

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 2346

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Price recently reduced. Located Eastern Pennsylvania. Box 2347

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels. Wisconsin D-2—6 cyl. 5¼"x6½" engines. Good condition. St. Paul, Minnesota. Box 2350

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo New York. Box 2354

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 2352

LINK-BELT, MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2356

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2357

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2359

BUCYRUS-ERIE GA-3 Gas-Air 1¼ yard shovel. Single shaft cat. Electric starter. Waukesha 4-cylinder 6¼"x8" engine. First class condition. Located near St. Louis. Box 2363

BUCYRUS-ERIE 1035 Gasoline 40' boom dragline and clamshell, including 1-yd. dragline and clamshell buckets. 26" cat. treads. Waukesha engine. In first class working condition. Motor, Caterpillar mounting and all working parts recently checked. Located Nebraska. Box 2364

AUSTIN MODEL "MA"—Gasoline Dragline—37' Boom—¾ yd. Page "M" drag bucket. Good operating condition. Located western Nebraska. Box 2365

BUCYRUS-ERIE 33-B—1¼-yard gas shovel — chain crowd. One year old. Worked less than half the time since sold new. Located Northern Minnesota. Box 2367

BUCYRUS-ERIE 16-B Gas Shovel, Dragline and Clamshell. ⅝-yd. Shovel dipper. 35' Clamshell—Dragline boom. Winch head. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2370

LINK-BELT K-44 Dragline. 44' Boom plus 8' Extension—53'. 1½-yd. Omaha bucket. Waukesha 4-cylinder 6¾"x8" engine. Located Northwestern Missouri. Box 2371

UNIVERSAL ½-yd. Shovel and 35' Boom Dragline. Waukesha Engine. Distributor frame for mounting on truck but not including truck. Thew caterpillar mounting available. Working condition. Located Illinois. Box 2373

5—MARION MODEL 37, 1¾-yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 2362

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

TYPE P McMYLER LOCOMOTIVE CRANE. Built 1927, 100 ft. Goose-neck boom, 19 ft. gauge, 20,000 lb. lifting capacity at 90' radius. Single line 5-yd. bucket. Very little used and in excellent condition. Located on coal dock in Northern Michigan. Box 2283

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2319

BUCYRUS-ERIE—Class 320 Steam Dragline, 144-foot boom. 8-yard bucket. Located on Illinois River. A good buy. Box 2321

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Complete overhaul recently. Box 2322

MARION — MODEL 70-E — 3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 2349

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Some extra parts included. Located Georgia. Box 2372

BUCYRUS-ERIE 50-B Diesel Dragline Kohler Light Plant. Worked less than half the time since sold new. Good condition. Located Illinois. Box 2358

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 2361

BUCYRUS-MONIGHAN Model 3½-T—70' boom dragline. 2½-yard dragbucket. Fairbanks Morse Diesel engine. Located Nort Dakota. Box 2366

MARION—MODEL 350—8 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt —Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 2348

MISCELLANEOUS EQUIPMENT

SHOVEL EQUIPMENT—For Bucyrus-Erie 52-B Diesel. Handled only about 4,000 yards material. Equipment located Alabama. Box 2351

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State. Box 2353

AMSCO—2½-Yard Manganese Steel, heavy-duty, rock type dragline bucket, including all necessary chains and 11 teeth. Located Minnesota. Box 2368

QUARRY SHOVEL — MOTOR-GENERATOR SET — 4 YARD
ONE GENERAL ELECTRIC MOTOR-GENERATOR SET consisting of 250 HP synchronous motor 2300/4000 Volts, Hoist generator 125 KW, Swing generator 40 KW, Crowd generator 39 KW, and one Exciter motor-generator set driven by 15 HP Induction motor and one Stationary panel for starting synchronous motor. All in good operating condition, ready for immediate service. Located Minnesota. Box 2374

SURPLUS MINE EQUIPMENT
BARGAIN PRICES

Write for prices of this equipment. Save money. Located in Minnesota.

1—Boiler, locomotive type, 150 H.P.
1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.
3—Rotary converters, 300 Kw., HCC-6-300-1200, Forms P, D, & V, 6 and 3 phase.
1—Switchgear for 3-phase rotary converter, complete, semi-automatic.
3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.
1—Ainley placer gold machine, complete. 4-bowl with feed hopper for dragline operation. 40-50 tons per hour.
30—Hoists, single and double drum.
1—Bucket loader.
8—Pumps, steam (1 gas engine driven) from 49 to 3700 g.p.m.
1—Tractor, Twin City No. 12-20.
1—Water softener, 5 ft., complete.

Box 2360

USED CONTRACTORS EQUIPMENT

1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
4—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
5—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
3—Jordan spreaders excellent condition.

Located Mississippi valley. Box 2355

BUCYRUS-ERIE TRAILER, practically new condition. Suitable for hauling 10-B, 17-B, 18-B or 19-B machines. Located Kentucky—attractively priced. Box 2316

AUSTIN MODEL 42-15 DITCHER. Twin City Gas Engine. 4-Cylinder 7¼"x9". Will cut 22" minimum to 42" maximum width to approximately 20' depth. Has seen comparatively little service and few repairs needed. Completely overhauled before last job. Will demonstrate on notice. Located North Carolina. Box 2369

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DRAGSHOVEL EQUIPMENT FOR GENERAL EXCAVATOR. 18'6" boom—6' dipper handle—will cut 32" wide. Practically new. Located Connecticut. Box 2293

FOR SALE, REASONABLE: All located Cleveland, Ohio. 1—Austin Trencher Model 42-15, $1,000 F.O.B.; 1—Buckeye Trencher Model 201, $1,300 F.O.B.; 1—Goose-neck Trench Hoe Boom for P&H 600, slightly used, $800 F.O.B. Box 2282

LOCOMOTIVE CRANE—O&S 30-ton, steam— 8 wheels standard gauge—MCB truck. 75' boom. Located central Illinois. Box 2305

DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2332

FRONT-END EQUIPMENT of 50-B W. L. Electric Horizontal Crowd. 2 cu. yd. Coal-Loader. In good mechanical condition. Located Kansas. Box 2323

DRAG BUCKET
1½-YARD Type "Y" Bucyrus-Erie Drag Bucket. Good condition. Located Kansas. Box 2331

BUCYRUS-ERIE D-2 BOOM, sticks and 1 cu. yd. Esco Bucket. All very good condition. $400.00 for quick sale. Located Oakland, California. Box 2335

BLOWER, Roots, Size 2, direct connected to steam engine. Excellent condition. Located Milwaukee. Box 2339

LAWRENCE 6" double suction centrifugal pump direct connected to vertical steam engine—mounted on skids. Excellent condition. Located Milwaukee. Box 2340

ADAMS Model 48—22' endless belt elevating grader. First class condition. Located West Virginia. Box 2341

If You Do Not Find What You Want Listed—Write Us
EXCAVATING engineer
South Milwaukee, Wis.

2—¾ YD. HAISS HI-POWER CLAMSHELL BUCKETS with teeth. Box 2377

FOR SALE: 1 Allis-Chalmers 5" Newhouse crusher; One 40' conveyor with steel frame and 24" belt; one steel hopper, 4-yd.; two dragline buckets; one rotary pump.
O. P. BOYSEN, Cochrane, Wis.

WANTED

WANTED: 5-yd. or larger slackline, no dragline outfit wanted. 30" belt conveyor (continuous) in 100' sections or 33' sections, 24" Stacker in 33' sections or less. Also 1½ to 2-yd. Slackline for aggregates. Box 2376

Best ⅝-yard dragline $1,000.00 cash will buy. Box 2375